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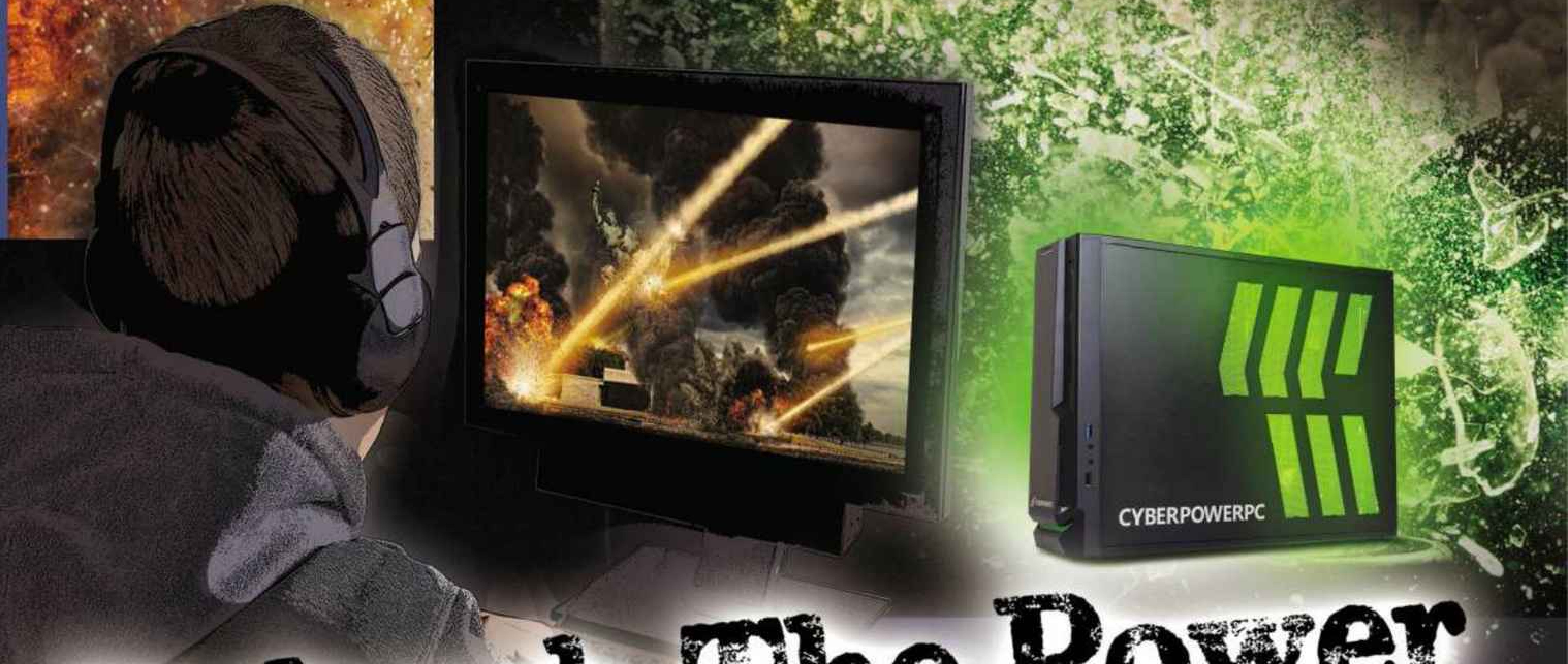

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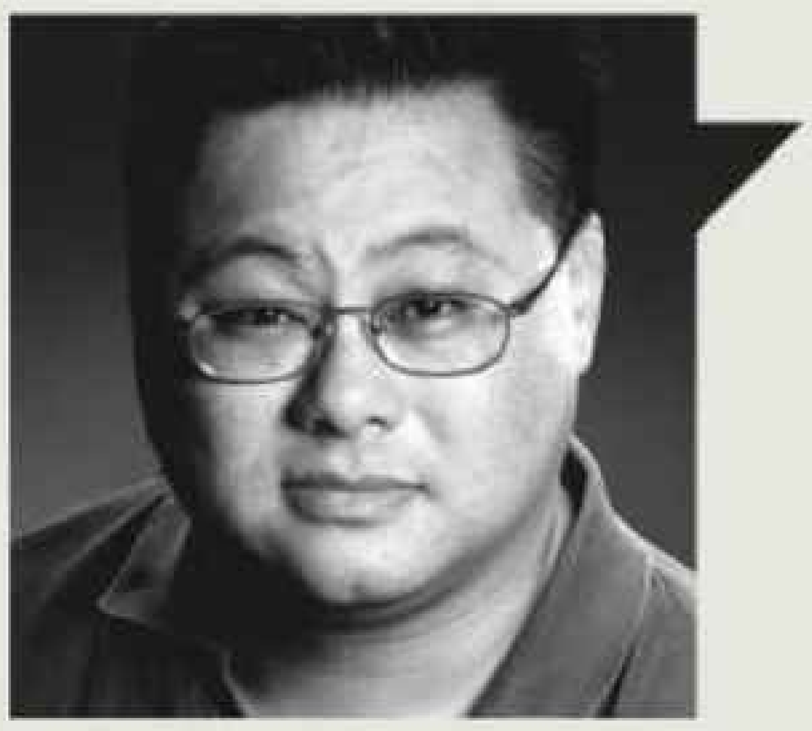

Gordon
Mah Ung

ALL GOOD THINGS...

LET'S NOT BURY THE LEDE, as they say in the newspaper business. This issue of *Maximum PC* will be my last. After more than 200 issues, 16 Dream Machines, and lots of bent hardware, my time here is done.

It's been a glorious time, too. When I started at *boot* (the predecessor to *Maximum PC*), fat CRTs were in, a Pentium II was the hotness, and real nerds had separate cards for 2D and 3D display. Heck, you had to have a separate MPEG2 decoder card just to play DVD-resolution videos. And Fast Ethernet cards, too.

Yup, in other words, I have been at this a hell of a long time. When old-timers leave, they inevitably wax poetic about the fun times they had. You know, like the time we accidentally triggered the fire alarm system causing a building-wide evacuation, a fire truck to roll up, and a pretty pissed off stare from the facilities manager. That, of course, wasn't as bad as the previous unnamed staffers who tested a "fire proof" data safe with a gallon of gasoline and a box of Duraflame logs. Somehow the tiny five-pound fire extinguisher didn't work and, well, this time the firefighters actually had something to put out when the fire truck rolled up to the parking lot.

There are stories of prototype hardware shattered, motherboards exploded, CPUs bent, and pranks played on staffers. Belly-aching laughs at the expense of, well, everyone, and the ever-exciting job of waiting for Santa Claus in the brown suit to bring the latest-and-greatest piece of hardware to test.

Through it all, the PC has never disappointed me in my belief that it's the most valuable technology tool known to mankind. It's always there to solve any problem you might have. Need to create 250MB photo mosaics using hundreds of photos, and then project it on a wall, and couple it with a touchscreen so people can zoom in and out to find themselves? The PC can do it. I know, because I did such a project recently using nothing but off-the-shelf parts, and with just two days to plan it out, too.

And though I sound like a broken record, I'm going to say it again. The PC is not dead and there is no post-PC unless the future means that work and other things of consequence aren't going to be done. For that, we need to thank the hardware and software vendors who continue to push forward because that is the only direction to go.

It would also be wrong of me not to thank the current and former staff of *Maximum PC*. They have been some of the greatest journalists I've had the pleasure of working with.

I'll save my last few words for you though, the loyal reader of *Maximum PC*. Many of you have been reading the magazine for years and many of you have just discovered the wonders of the PC recently. Thank you for one hell of a ride and always believing in the PC. I'll be just like you now—a subscriber and reader of *Maximum PC*.

Gordon Mah Ung is Maximum PC's *editor-in-chief, senior hardware expert, and all-around muckraker.*

↘ submit your questions to: comments@maximumpc.com

THE NEWS

Obama Backs Net Neutrality

POTUS gives the FCC a firm push in the right direction

JUST AS THE FEDERAL COMMUNICATIONS COMMISSION (FCC) is weighing up new rules for safeguarding competition and user choice on the web—stuff that really matters—President Obama has come out staunchly in favor of "the strongest possible rules to protect net neutrality."

The President says the U.S. economy is reliant on an open Internet, and that the principle of net neutrality is not one we can take for granted.

"I believe the FCC should create a new set of rules protecting net neutrality and ensuring that neither the cable company nor the phone company will be able to act as a gatekeeper, restricting what you can do or see online. The rules I am asking for are common-sense steps that reflect the Internet you and I use every day, and that some ISPs (Internet service providers) already observe," Obama said.

Obama called for rules that would prevent ISPs from blocking access to a website or service, so long as the content is legal, along with restrictions on throttling Internet access. He also made a pitch for more transparency, and perhaps most importantly, said he is against paid prioritization, which would result in so-called "slow lanes" for services that don't pay a fee for unfettered access into consumers' homes.

"So the time has come for the FCC to recognize that broadband service is of the same importance [as the conventional telephone system] and must carry the same obligations. I believe the FCC should reclassify consumer broadband service under Title II of the Telecommunications Act—while at the same time forbearing from rate regulation and other provisions less relevant to broadband services," Obama added.

The FCC received around 3.7 million comments since chairman Tom Wheeler proposed new traffic rules in May. Most were in favor of a free and open Internet without fast and slow lanes or throttling.

Obama, then, is siding with consumer advocates who have long argued in favor of the reclassification, while the telecommunications industry lobbied against it. The President did also recognize that the FCC is free to ignore his advice. However, FCC chairman Tom Wheeler, an Obama appointee, has reportedly been edging ever closer to reclassification.

Wheeler's most recent public stated position favors reclassifying connections between ISPs and websites as Title II services, but leaving the connection between ISPs and end users lightly regulated. Obama is asking Wheeler to go the extra mile and have "consumer broadband services" reclassified, too.

For now, Wheeler has responded, saying, "as an independent agency we will incorporate the President's submission into the record. We welcome comment on it and how it proposes to use Title II of the Communications Act."

Any reclassifications won't instantly become done deals. The heavyweights of the industry have a track record when it comes to net neutrality and legal action. Verizon has already won one such legal contest with the FCC.

What's more, like any president late in a second term, Obama's influence is waning. But one thing is for sure. We're all a hell of a lot better off having POTUS with us on net neutrality than against us. **–PL & JL**

Whatever the President says or the FCC decides, telecomms corps such as Verizon could fight it in the courts.

> " I believe the FCC should create a new set of rules. The rules I am asking for are common-sense steps that reflect the Internet you and I use every day.

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UBISOFT PULLS GAMES FROM STEAM, RETURNS THEM

Is Ubisoft planning an EA-style exodus?

Will *Assassin's Creed Unity* stay on Steam?

FIRST IT WAS THE STEAM STORE in the UK. Then it happened over here. Upcoming titles from Ubisoft's library were disappearing from Valve's digital game distribution platform across the world. In response to UK media coverage, Ubisoft said: "We've been in discussions with Valve about *Assassin's Creed Unity*, but for the time being the game is not available via Steam in the UK. UK customers wishing to purchase the game digitally can do so by visiting the Uplay store, our retail partners, or other digital distributors."

The statement addresses *Assassin's Creed Unity* in the UK, but doesn't explain why it happened or why, later on, all three upcoming games, including *Far Cry 4* and *The Crew*, were pulled from Steam on a global level.

Days later, *Assassin's Creed Unity*, *Far Cry 4* and *The Crew* reappeared on Steam U.S., but remained off-menu in the UK. It's reminiscent of a similar episode when Electronic Arts began pulling its games from Steam and eventually reserved its new release titles for its own digital distribution platform, known as Origin.

The upshot is that fans of the *Mass Effect* series would only be able to play *Mass Effect 3* on Origin while the first two games are still available on Steam. Is Ubisoft trying to wrangle a deal out of Valve? Or is it a sign that all future Ubisoft titles will only be available on Uplay?

The likes of Ubisoft will never be totally happy with a third party in Valve dominating distribution, and EA has shown that selling PC games outside of Steam is doable. We'd usually say competition is good, but the result could be a messy future of multiple libraries, logins and accounts. **–SK**

intel
pentium 4

INTEL SETTLES BENCHMARK "CHEATING" LAWSUIT

OWNERS OF PENTIUM 4 PROCESSORS CAN NOW CLAIM THEIR RANSOM

HARD TO BELIEVE NOW, but AMD was once a serious threat to Intel's dominance of the PC processor market. So serious that it's alleged Intel manipulated benchmarks to cover up "design flaws" and "dismal" performance scores of its then-new Pentium 4 CPU. "Intel used its enormous influence to, in Intel's own words, 'falsely improve' the Pentium 4's performance. It secretly wrote benchmark tests that would give the Pentium 4 higher scores, then marketed these 'new' benchmarks as 'independent third-party' benchmarks," reads the class action complaint against Intel and HP.

Long story short, Intel has settled the suit and all members of the class are entitled to a reimbursement of $15. Visit http://bit.ly/1v2T2wC to find out if you qualify. **–PC**

MSI UNLEASHES NOTEBOOK WITH MECHANICAL KEYBOARD

GT80 gaming portable is a world's first

WE'RE BIG on mech keyboards this month (check out page 44). So, the announcement of the world's first notebook PC with a mechanical keyboard has arrived just in time. It uses Cherry MX Brown key switches, but little else is known about the 18.4-inch GT80 Titan. Rumor says it may wield a GTX 980 SLI configuration and up to 32GB of RAM. We're betting on it being a full-blown desktop replacement. No word yet on price or availability. **–PL**

Tech Tragedies and Triumphs

A monthly snapshot of what's up and down in tech

TRIUMPHS

MAXWELL MONEYSPINNER
Nvidia announces record revenues in the wake of its new graphics chips. PC gaming calls to say it told you so.

8GB GRAPHICS
You can never have too much graphics memory. Probably. AMD seems to think so with the launch of the 8GB Radeon R9 290X.

OLD PC OWNERS REJOICE
Far Cry 4's minimum system requirements are out. You're good to go with an ancient Core i5-750 and just 4GB of RAM.

TRAGEDIES

NO MORE NOKIA?
So much for Microsoft's intention to use Nokia branding for 10 years. Say hello to the Microsoft Lumia 535.

SEE NO EVIL
Whistleblower The Counterfeit Report bought 250 fake items on eBay over nine months. eBay's response? Ban CR's eBay accounts.

SHOW SWIFT THE MONEY
Taylor Swift pulls her music from Spotify. The streaming service retorts that she would have received up to $18 million in royalties. Ouch!

Tom Halfhill

FAST FORWARD

Big-Iron Processors Preview the Future

ALTHOUGH FEW *MAXIMUM PC* READERS actually build our annual Dream Machine, it's still fun to see what a no-compromise machine looks like. Sooner than you think, equally powerful PCs will be on sale at Best Buy for a few hundred bucks.

***MPC*'s Dream Machine can't compete with Oracle's 32 cores.**

For the same reasons, high-end microprocessors are a fascinating study. Designed for modern mainframes ("enterprise servers") and gym-sized supercomputers, these specialized chips stop at nothing to deliver kickass performance. Their innovations often trickle down into mass-market processors several years later.

Two new big-iron processors are Fujitsu's SPARC64 XIfx and Oracle's SPARC M7. Both are compatible with the SPARC architecture pioneered by Sun Microsystems in the '80s. They're relics from a bygone age when Intel's x86 architecture and Microsoft Windows didn't rule the world, but they still survive, and they're still innovating. Fujitsu designs its own SPARC-compatible chips, and Oracle took over SPARC development after buying Sun in 2010.

Common folk can't buy these things. Fujitsu designed its 34-core SPARC64 XIfx for its own supercomputers, which are sold only to governments and perhaps a few rich corporations. Oracle's 32-core SPARC M7 will be more widely available in business servers, but is optimized to run Oracle's enterprise database software. Nevertheless, both chips have features that breed envy.

> Designed for supercomputers, these chips stop at nothing to deliver kickass performance... and their innovations often trickle down into mass-market processors several years later.

Fujitsu's SPARC64 XIfx is the first processor to use Micron's Hybrid Memory Cubes. Each cube is a stack of DRAMs with a proprietary interface. The SPARC64 XIfx can link to eight of these cubes to provide up to 240GB/s of peak DRAM bandwidth. By contrast, Intel's Core i7-4960X Extreme Edition in the 2014 Dream Machine provides only 59.7GB/s, and the Dream Machine's Core i7-4790K has only 25.6GB/s. (Feeling constipated?)

Another unusual SPARC64 XIfx feature is its layout. Its 34 cores occupy two 17-core clusters, each with 16 primary cores, one "assistant core," 12MB of L2 cache, and private interfaces to four memory cubes. The assistant runs the control software, freeing the primary cores for computations. Physically, the XIfx isn't a heterogeneous processor—all 34 cores are the same—but they shoulder different duties. This goes beyond the "affinity" concept in which a program prefers to run on a particular core.

Meanwhile, Oracle's SPARC M7 sets a record by integrating more than 10 billion transistors. By comparison, the Core i7-4960X looks dwarfish with only 1.86 billion. Even when fabricated in advanced 20nm process technology, the M7 will have a huge die (700mm2, by my estimate). But it's got more than 70MB of cache and 32 cores, and each core runs eight threads. Each chip has 341GB/s of memory bandwidth using 16 channels of DDR-2667 DRAM. Not enough? M7 supports systems with up to 64 sockets—up to 2,048 cores, 4.4GB of cache, 16,384 threads, and 128TB of DRAM. Now that's a Dream Machine!

For me, the most fascinating M7 feature is real-time data-integrity checking. It can supplement every 64-byte block of data with metadata that includes a version identifier. This follows the code from main memory to the caches and through the on-chip multicore network. The M7 compares each identifier with a valid reference and triggers an exception on any mismatch, helping to keep out buggy or malicious code.

High performance is expected from big iron, but security at every level is becoming equally important. And that's what I'd like to see trickle into my little iron.

Tom Halfhill was formerly a senior editor for *Byte* magazine and is now an analyst for *Microprocessor Report*.

SBX
SBX
DASH
COLOR
STORE
Welcome back!
Current lightbar colors and pattern
Current system status: IDLE
CPU TEMP
32°
48°
NETWORK
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USAGE
66%
71%
SPEED
531.2
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Thomas L. McDonald

GAME THEORY

The Charms of Nostalgia

NOSTALGIA IS A SWEET, SWEET DRUG. It screws with our perceptions and judgment, but pays us back with a warm feeling and a sure sense that, once upon a time, things existed in an ideal state.

The power of nostalgia is that there's almost always a solid truth at the heart of the myth. In gaming, for example, design tends towards the mean. Publishers spending lots of money on an A-list game know they can hedge their bets on a success by shooting for the mushy middle rather than pushing into new territory. Thus, once-complex tactical shooters like those found in the Tom Clancy series lose the prickly bits—the tactical planning and go-codes—that made them challenging. Strategy games get reduced to simple point-and-click affairs. Role-playing games become, essentially, first person shooters with stats and skill trees.

It's this last change that has hurt the most. I logged over 100 hours on *Skyrim*, and I think it's a rich and satisfying game. But is it really role-playing? Computer RPGs grew out of *Dungeons & Dragons*, and *D&D* was always a party-based, character-rich, stat-and-skill-driven experience.

MMOs return the party and thus the social element, but again: most modern MMORPGs are just action games with leveling.

The first game I ever wrote about was *Eye of the Beholder*, and through my nostalgia goggles it's The Best RPG Ever. All subsequent games, for me, are measured against it, as well as Gold Box games, *Ultima*, *Wizardry*, *Dungeon Master*, and *Might and Magic*. And by those standards, a lot of contemporary role-playing games, while offering their own pleasures, come up short.

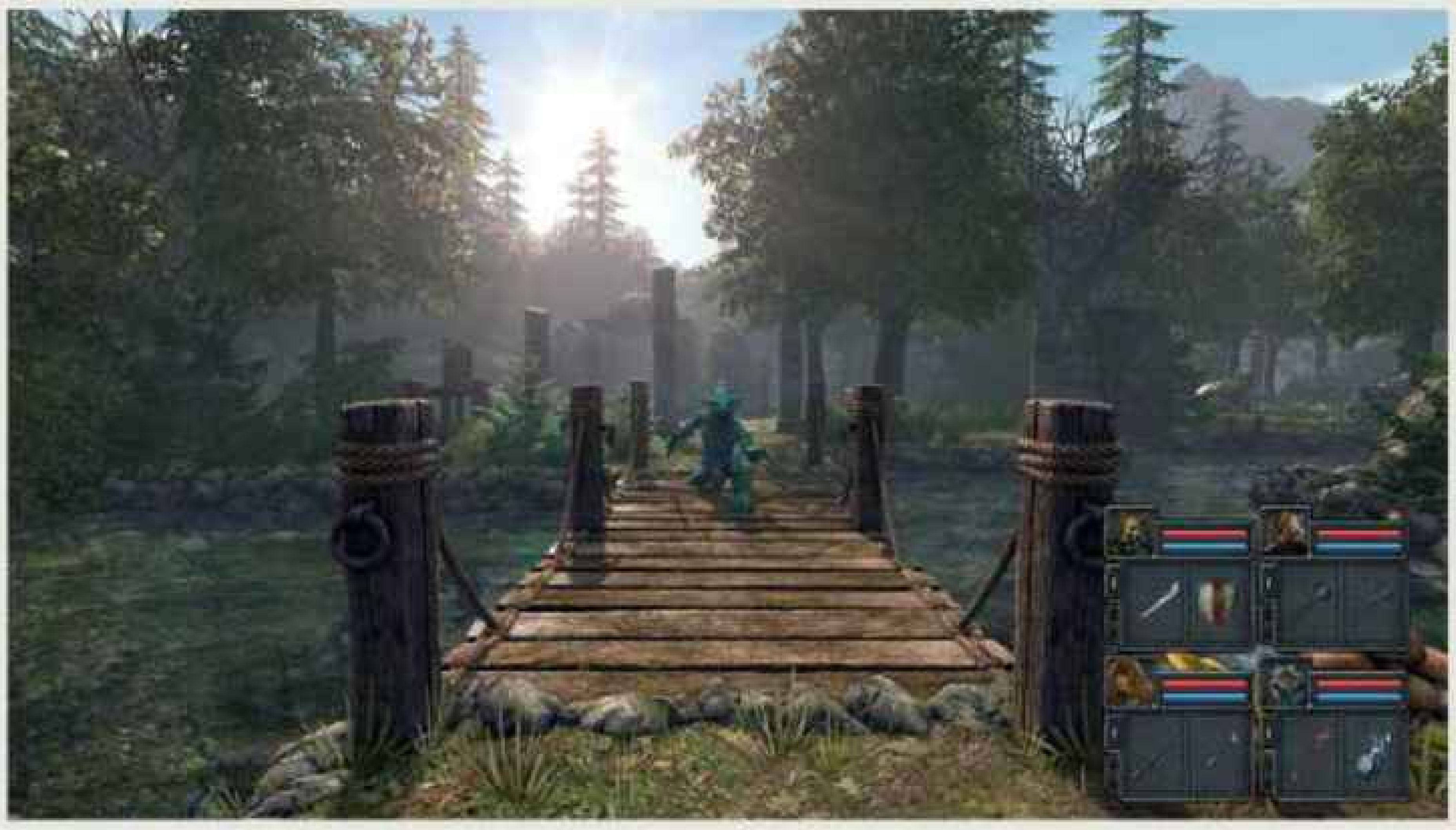
> "The first game I ever wrote about was *Eye of the Beholder*. All subsequent games, for me, are measured against it, and a lot of contemporary role-playing games come up short.

I've been spending a lot of time with an *Eye of the Beholder* nostalgia act lately: *Legend of Grimrock II*. Like both the original *LoG* and *Might and Magic X*, it brings the grid-based, multi-character old skool RPG into the 21st century.

If you have no experience with the old grid-based system, in which movement is stepped rather than free, the restriction will just feel bizarre. There's a good reason for that feeling: it is bizarre. It was done at the time because they couldn't render the world freely. When *Ultima Underworld* came out and you could move and look anywhere, it was like the clouds parted and the angels sang. It was wonderful. And yet… in the 20-plus years since, I've always thought fondly of *Beholder*, and *Grimrock* returns that warm feeling, all nicely packaged for my 46-year-old frame.

There is no earthly reason for an RPG in 2014 to tie movement to a grid. It works like haiku or genre fiction or a sonata, using certain restrictions of form and style to create a particular kind of art that embraces its rules and limitations. In doing so, it shows us that we don't always need to seek out realism in our game worlds. Sometimes, artificiality has its own charms.

Thomas L. McDonald is editor-at-large of *Games Magazine*.



Legend of Grimrock II **harks back to "the best RPG ever"** ***Eye of the Beholder*****.**

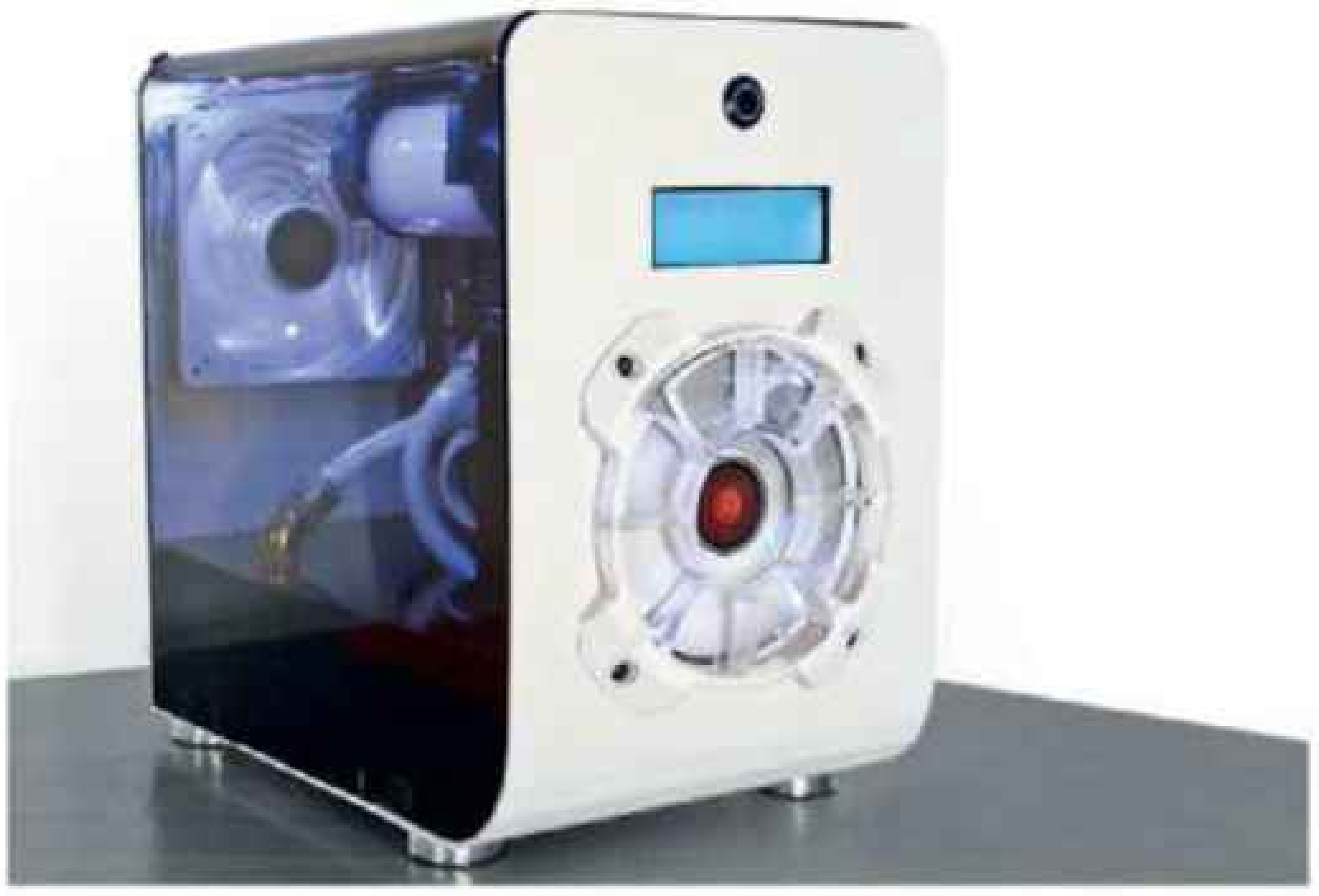
THE LIST

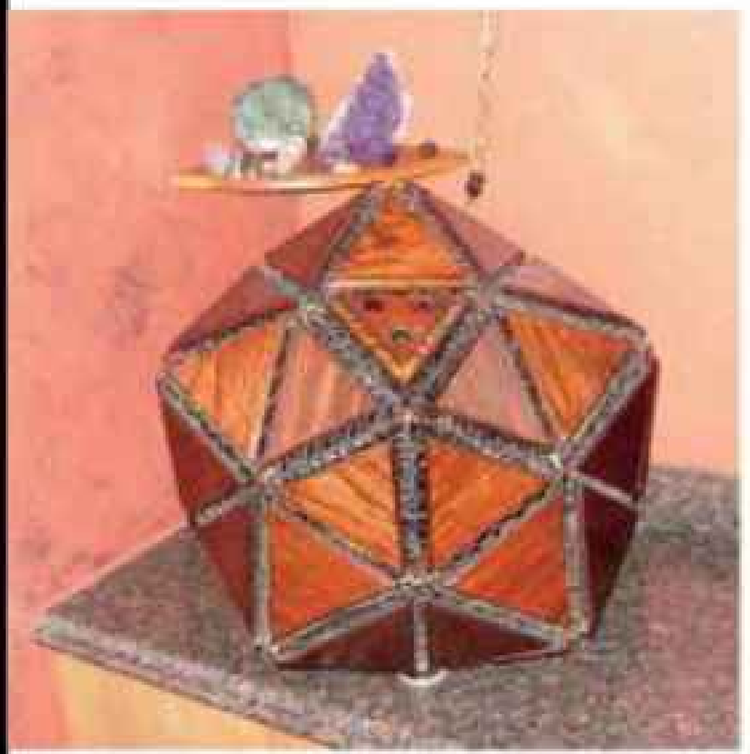
TOP 7 USER-SUBMITTED CUSTOM RIGS

7

COLD WINTER VERSION 3

Johan Nyman built this HTPC from scratch. It's designed to withstand the coldest of Swedish winters.





6

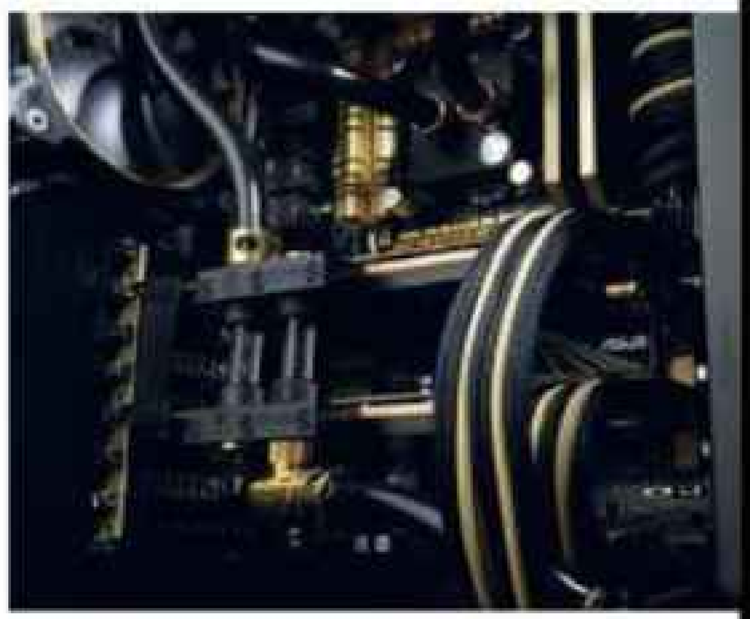
OROGENESIS

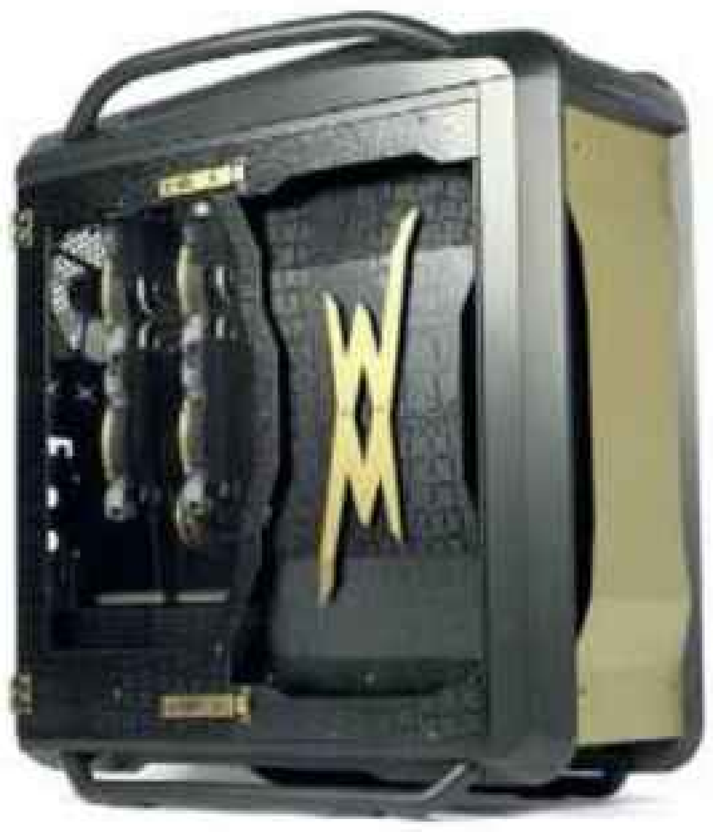
Sean Stebor's Orogenesis PC gets its name from the Greek word "oros," meaning mountain, and "genesis," meaning creation.

5

BLACK GOLD

Adam Birli's Black Gold PC is a case mod using a Corsair Air 540 case. As you know, "gold is best."

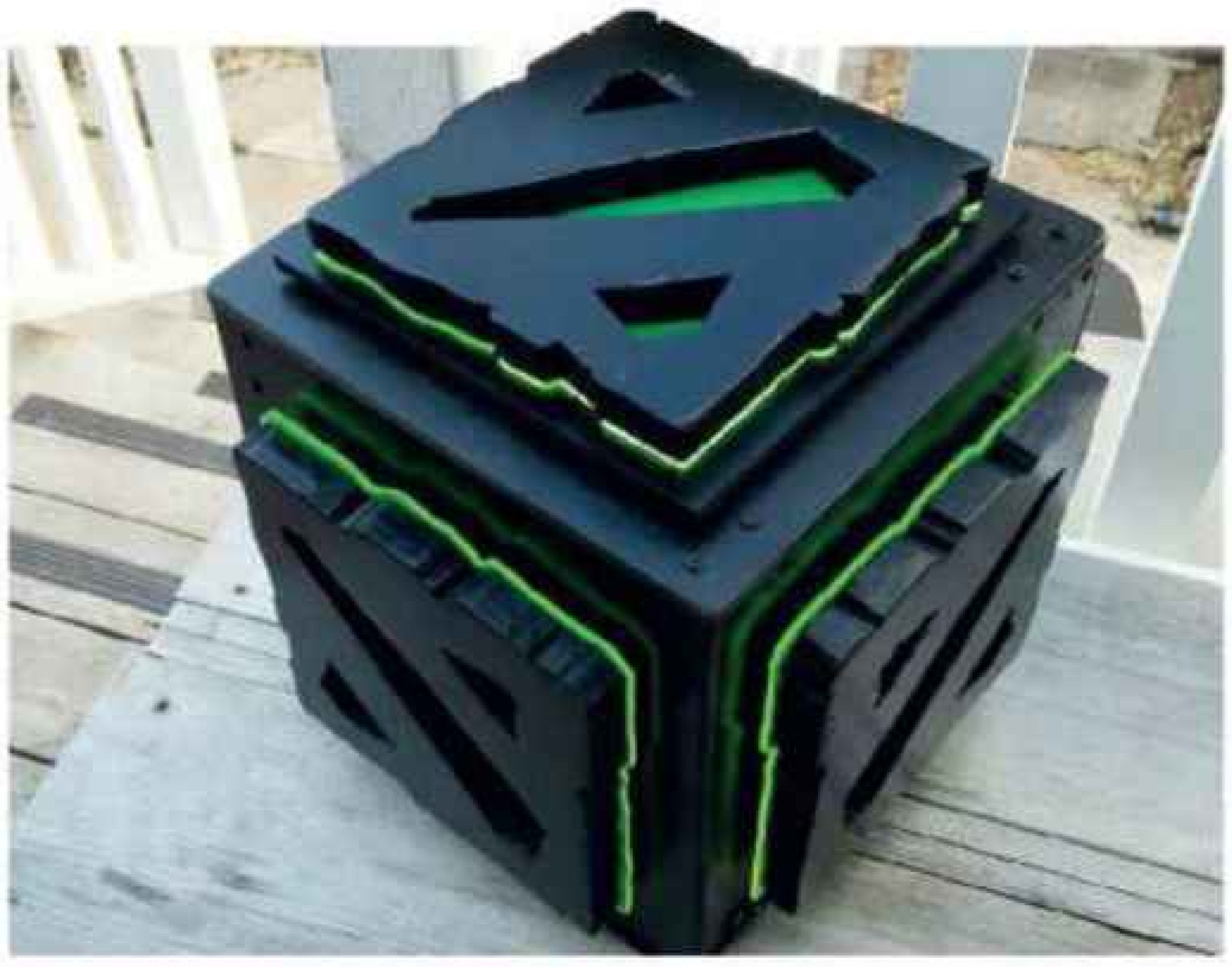




4

WATERMOD GOLD 24K

Mathieu Heredia's crocodile skin mod is the Gucci rig of PCs.



3

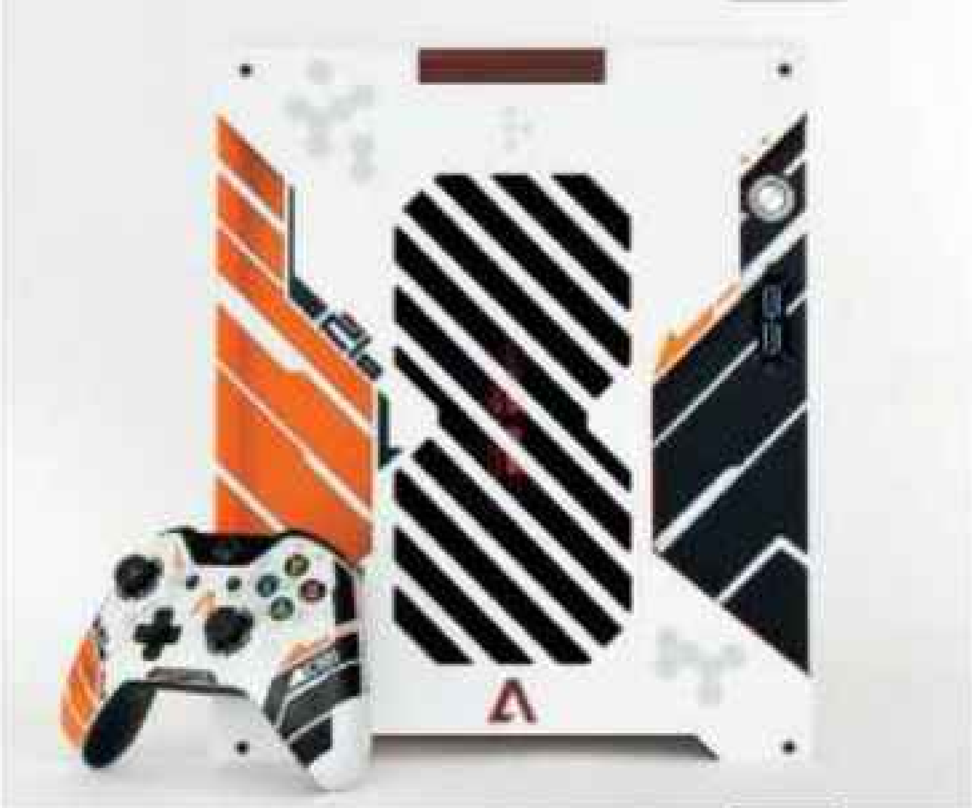
DOTABOX

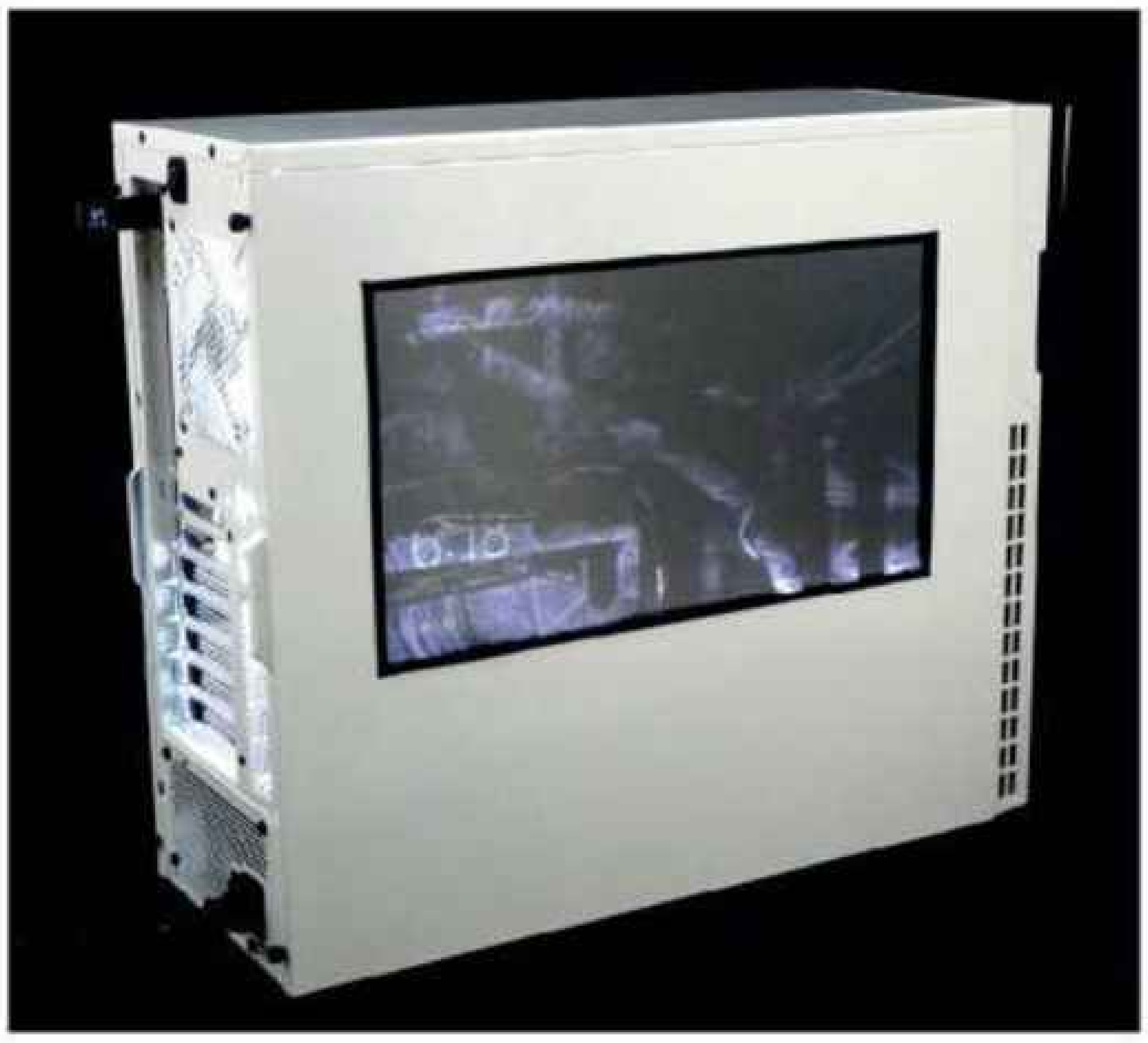
Jonathan Garlit's DotaBox is a case mod befitting the most played game on Steam.

2

PARVUM TITANFALL

James Walter's Titanfall case looks like a rig you'd find in the videogame by which it was inspired.





1

VISIBLE CONTRAST

Chris Albee's Visible Contrast has the slickest side panel you've ever seen.

Future

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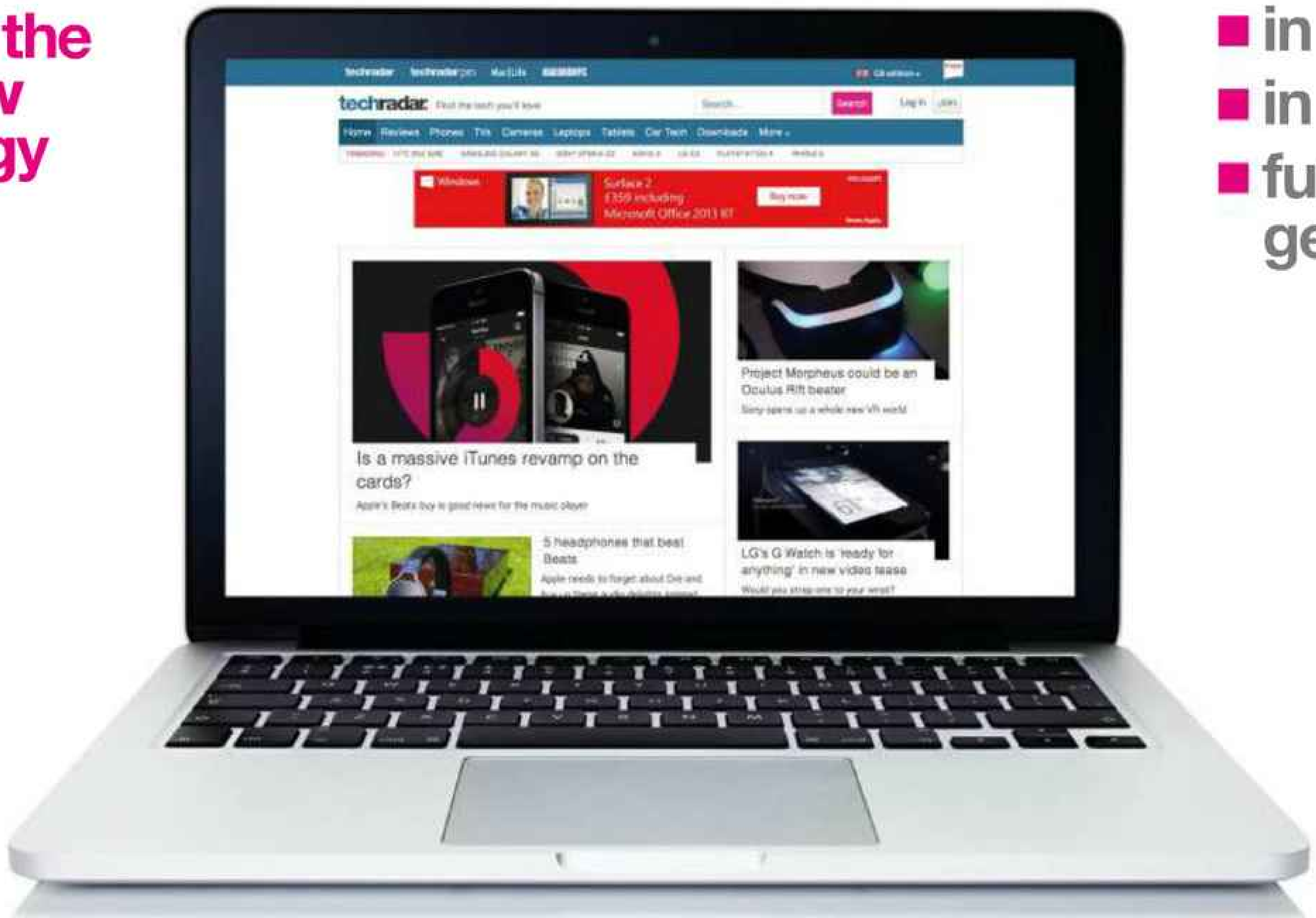

Is a massive iTunes revamp on the cards?

Project Morpheus could be an Oculus Rift beater

5 headphones that beat Beats

LG's G Watch is 'ready for anything' in new video tease

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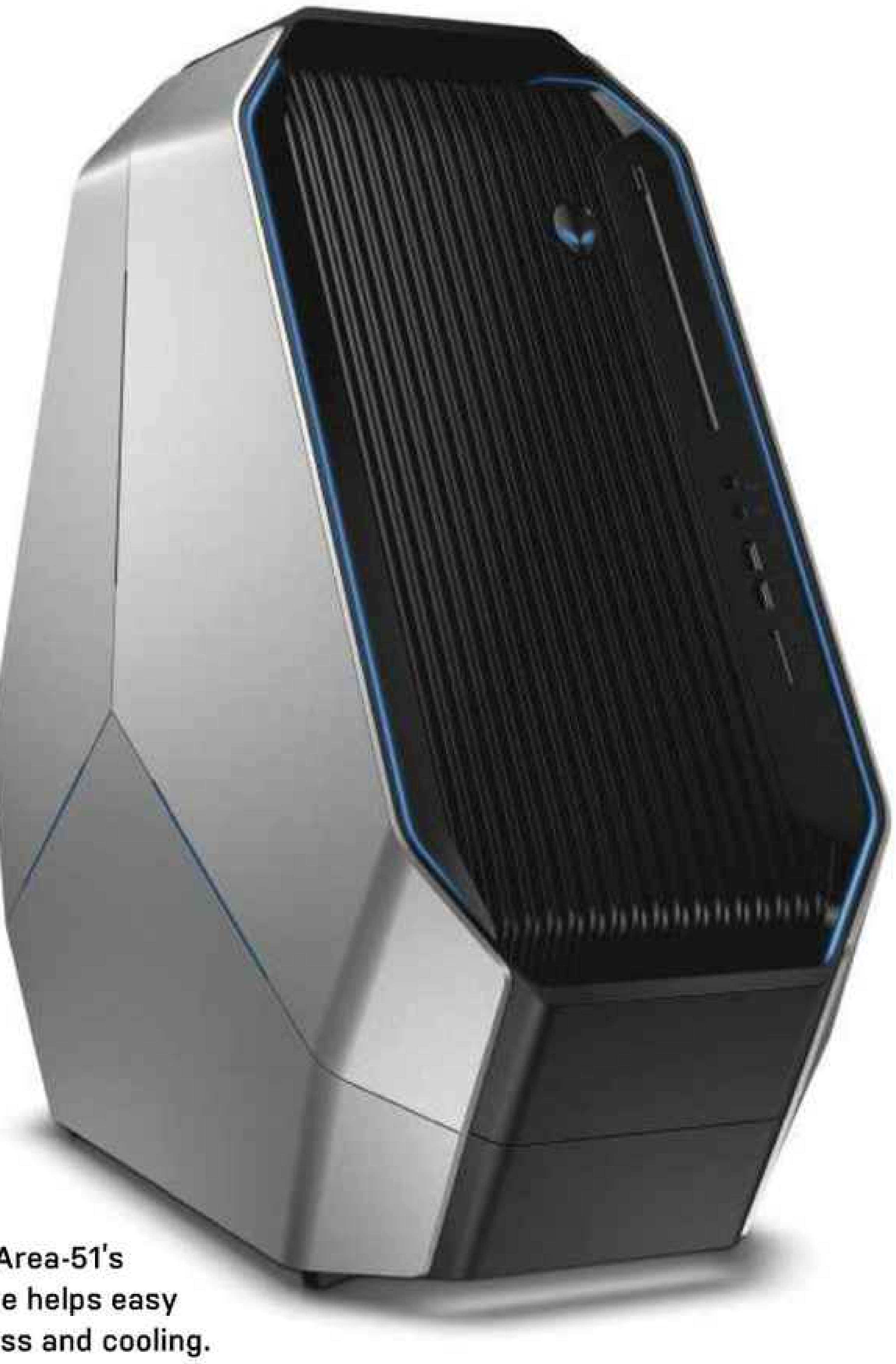
TALKING

Alienware's New Awesomeness

Ever the innovator, Alienware reveals its radical new chassis and external graphics for notebooks

You can have a great notebook. You can have great graphics. But you can't have both. At least not for long. Your notebook will all-too-soon get left behind by the upgrade cycle, right? Not any longer, thanks to Alienware. To find out more and also to discuss its revolutionary new "Triad" desktop chassis, *Maximum PC* hooked up with Eddy Goyanes, Alienware's global product marketer, and Ray Watkins, its technical marketing supervisor.



The Area-51's shape helps easy access and cooling.

Maximum PC:
Alienware has a super-cool new high-end desktop rig. Tell us about it!

Eddy Goyanes:
Our new Area-51 chassis is dubbed "Triad." It's iconic. A unique shape, but highly functional, too. Two main principles have driven the design: optimized thermal properties and ergonomics.

The Triad's diagonal design allows a freer flow and escape of hot air. The diagonal front surface has a large vent that draws in ambient air, which then exits through the rear. With a standard rectangular chassis, people often have the rear of the machine up against the wall.

That means there's very little clearance between the unit and the wall and so hot air gets chocked up and dust collects. Over time the dust and heat builds up and can lead to damaged components. The diagonal surfaces also allow the user to access the front and rear ports with a lot more ease than a rectangular case.

MPC:
What about accessing the inside of the chassis? Is it simple?

EG:
If you want to get inside, we made access for that really easy, too. It's basically as easy as opening a car door. There's one latch and everything comes off. The door is toolless and also cable-free. The lights in the door are enabled via a passive connector, there are no cables or connectors to unplug.

If you look at the huge opening, we designed it that way on purpose. Our gaming fan base likes to show off their rigs and also upgrade components. Everything is very accessible and very visible. Future upgrades will be a breeze.

MPC:
So what kind of firepower does the new Area-51 pack?

Portable Problems

What happened to being able to upgrade graphics in notebooks?

Upgradability has always been a problem for notebooks PCs. But it's a particular pain when it comes to graphics. Over the years, several solutions have been mooted. We remember doing an upgrade of the graphics module in a Dell Inspiron 8500 from Nvidia GeForce 2 Go to GeForce 4 Go fully 10 years ago. Good times. Since then, other efforts have included the MXM mobile graphics module specification. But the key issue doesn't change—laptops are essentially proprietary designs with very tight packaging and thermal tolerances. That makes the idea of a standard mobile graphics form factor pretty much impossible.

Notebook graphics upgrades? No problem, says Alienware.

Head to www.maximumpc.com to watch the interviews in full.

EG:
The CPU is Intel's Haswell-E and it supports both AMD and Nvidia graphics in single, dual, triple, and even quad-GPU configurations, the latter via dual Nvidia Titan Zs.

MPC:
Can you tell us a bit more about the multiple handles on the case and specifically how they help portability?

EG:
Every part of the chassis is designed to enable an easy experience for the common issues that hardcore gamers face when they buy a full tower desktop. That includes lifting and carrying the case.

There are handles both top and bottom and you can use all of them with confidence that you're not going to break any of the surfaces. Some other chassis out there have panels and surfaces that are really just cosmetic and have no structural value. You might crack or break the case just lifting it up.

MPC:
How much will we have to stump up to get our hands on one of these tasty new Triads then?

EG:
It starts at $1,699.

MPC:
OK, now over to you, Ray. What's this crazy-looking black toolbox?

Ray Watkins:
Ha, I call it the Alienware shoebox! This has been our big secret. We're extremely excited about it, about its flexibility, and its usability. One of the main things gamers criticize notebooks for is upgradability. After a year or two you want more graphics horsepower. Now you can with the Alienware Graphics Amplifier.

It's an external desktop graphics card, in this case an Nvidia GeForce GTX 980. We're hooked up to the Alienware 13 notebook using PCI Express and USB.

MPC:
So everything goes through that single cable?

RW:
Yes, it's a proprietary cable [so you'll need an Alienware 13 notebook]. We've basically taken PCI Express out of the system and moved it into an external enclosure. You put your desktop graphics card in and you have all your desktop ports on the back as well, including USB.

MPC:
So it acts as a docking station, as well?

RW:
Yeah. If you want to go to work or a friend's house, you want to be mobile and you take your Alienware 13. But when you come home, you want the horsepower of a desktop. You have everything set up on your desktop—your mouse, your keyboard, your external hard drive, your monitors—so you just connect the cable and you're getting the horsepower of desktop graphics. You can use Nvidia or AMD graphics, you're not locked in to either.

MPC:
Does it support multi-GPU configurations such as SLI?

RW:
No, it's a single-card solution. But the cool thing is if you don't have an external display attached, it'll push back to the notebook display, so that runs off the external graphics.

MPC:
How much is the Amplifier and the Alienware 13 notebook?

RW:
It's $299 for the Amplifier and $999 for the Alienware 13 notebook.

DOCTOR

THIS MONTH THE DOCTOR TACKLES…

> CPU upgrades
> Dual monitors
> Full hard drives

Upgrade or Wait?

My system: Intel Core i7-920 at 3.8GHz, an Asus P6T motherboard, 18GB RAM, Crucial m500 480GB SSD, 4TB HDD, Gigabyte WindForce GTX780, with Windows 7 64-bit Pro. Although I can play games maxed out at 1080p, I'm looking to upgrade the CPU and motherboard soon. Should I wait for next generation or go for Haswell-E now (i7-5820)?

—J. Richard Burton

THE DOCTOR RESPONDS: Whether or not you should wait for Broadwell, Skylake, or some other chipset/CPU combo depends on your needs. If you were to spring for a Haswell-based Intel Core i7-4970K on the LGA 1150 platform, that would be a big upgrade you'd definitely feel, and you could keep using your DDR3 RAM. If you went with a Haswell-E upgrade via a Core i7-5820K, you'd have to buy expensive DDR4 memory, plus a more expensive LGA 2011-3 mobo. But if you need 12 CPU threads, the Core i7-5820K CPU is the way to go. Its X99 mobo chipset should also be compatible with Broadwell-E CPUs when those come out in Q3 of 2015.

The GPU Conundrum

I have a custom made desktop computer that I've been tinkering with for some time. It uses dual GTX 780 GPUs plugged into a 4K Samsung monitor connected via Displayport. My question is whether or not it's possible to have a dual monitor setup with the second monitor running 1920x1080 connected via HDMI to the onboard Intel HD4600 graphics chip that came integrated with my Core i7 processor? Currently my Windows 7 Home Edition does not even see the HD4600 graphics on my PC. I was told this is because when a discrete graphics card is used, it automatically turns off the integrated graphics. If this is true, how do I go about changing that so I can use my discrete GPUs for my 4K monitor and the HD4600 graphics for a second monitor? Do I have to reboot Windows without the GPUs installed to force it to recognize the integrated graphics, and then reboot again with the GPU installed, or will that turn off the HD4600 as well? Also, will the second monitor connected via HD4600 graphics need an HDMI connection or another Displayport connection via the motherboard? Any help is greatly appreciated.

—Jason Mesa

THE DOCTOR RESPONDS: The short answer to your question is that it's not possible with the combo of GTX 780 cards and integrated Intel graphics. You can use one or the other, but not both at the same time, and there's no reason for you to use the integrated graphics at all. Some combinations of AMD hardware (both CPU and GPU) do allow this, but not on the Intel/Nvidia side of things since those camps don't play nice with each other. However, you can run a second display from your GPUs, as rendering a 2D desktop requires very little processing power for today's video cards. To do that you would just need to go ahead and plug both monitors into one of your 780s. Check Nvidia's website for instructions on how to connect dual monitors for SLI to figure it out.

FATAL1TY
ASRock
X99X KILLER
Super Alloy
GAMING
8xDDR4
M.2
X99

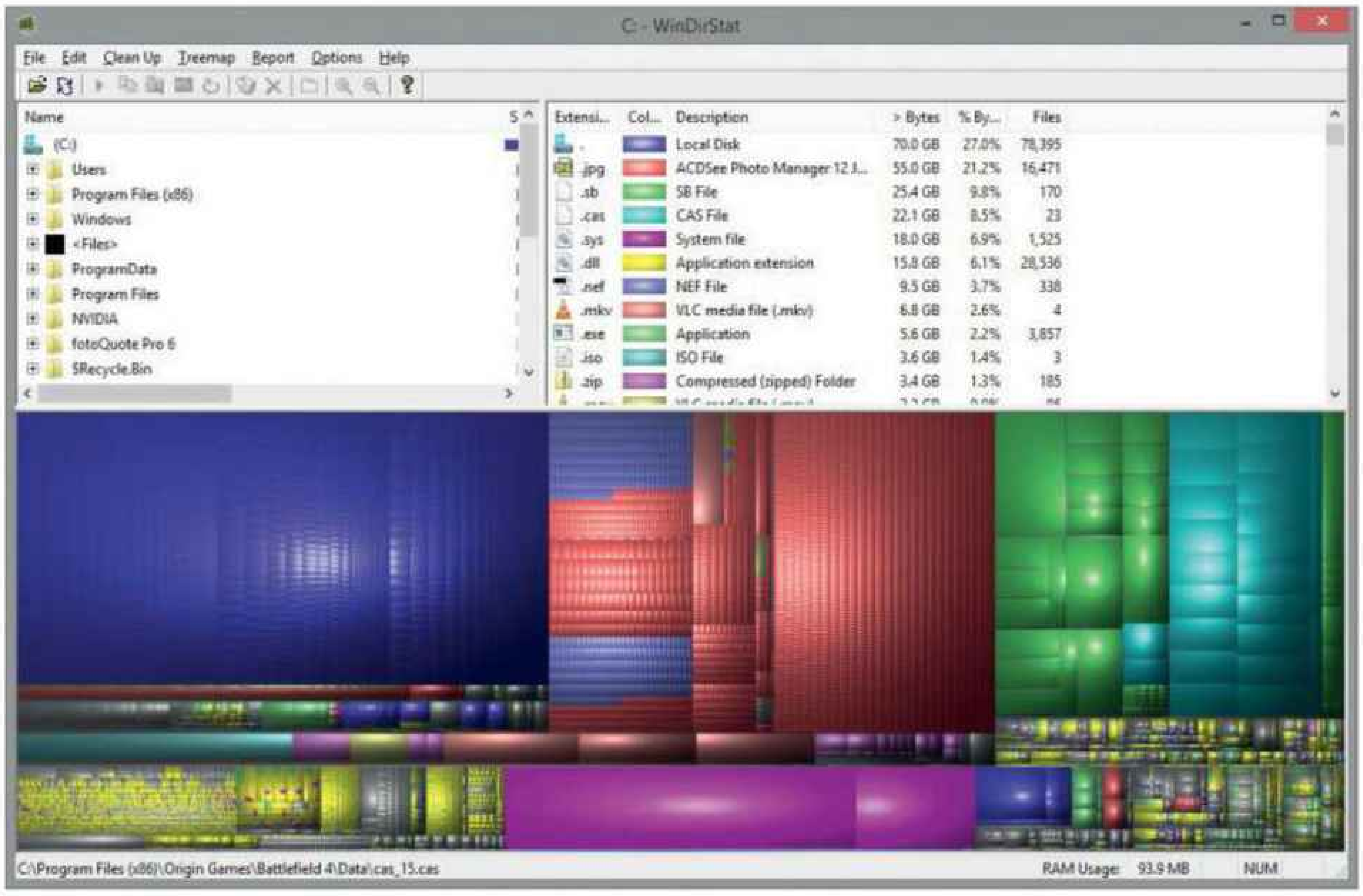
Upgraders need to think hard about the X99 chipset's arrival, as it will also require expensive DDR4 RAM.

Is It *Really* Full?

I recently moved from Korea to Virginia because I'm part of the Army. I made sure to disconnect my hard drive cables to make sure they were not damaged in the move. When I reconnected them the primary hard drive was fine. However, the backup hard drive is saying that it's low on space whenever I try to run my backup program. The weird thing is they are both the same size hard drives. I'm making sure to only keep the latest copy of the backup data, so what could be keeping the computer from properly backing up?

—Alexander

↘ submit your questions to: doctor@maximumpc.com



Extensi...	Col...	Description	> Bytes	% By...	Files
.	🟦	Local Disk	70.0 GB	27.0%	78,395
.jpg	🟥	ACDSee Photo Manager 12 J...	55.0 GB	21.2%	16,471
.sb	🟩	SB File	25.4 GB	9.8%	170
.cas	🟦	CAS File	22.1 GB	8.5%	23
.sys	🟪	System file	18.0 GB	6.9%	1,525
.dll	🟨	Application extension	15.8 GB	6.1%	28,536
.nef	🟦	NEF File	9.5 GB	3.7%	338
.mkv	🟥	VLC media file (.mkv)	6.8 GB	2.6%	4
.exe	🟩	Application	5.6 GB	2.2%	3,857
.iso	🟦	ISO File	3.6 GB	1.4%	3
.zip	🟪	Compressed (zipped) Folder	3.4 GB	1.3%	185

C:\Program Files (x86)\Origin Games\Battlefield 4\Data\cas_15.cas RAM Usage: 93.9 MB NUM

Find out what's taking up space on your HDD with WinDirStat.

THE DOCTOR RESPONDS: We have no idea what backup program you're running Alexander, or why one of your drives would suddenly be full, but step one for diagnosing any problem involving a surprisingly full hard drive is to investigate what is taking up all that space. We prefer the freeware program WinDirStat as it's free, and we're cheap, plus it's also easy to use and shows you exactly what is hogging all them bits, both in graphical and numeric displays. Download that program and point it to your "backup" drive in order to find out what's taking up all that space. Second, be sure to closely examine your backup program as it sounds like it's just saving image files to the drive and not deleting the older one, or just updating the image file with what's changed since the last time your ran it. For what it's worth, we still use the popular freeware backup and syncing tool named SyncBack. It's free, and can sync drives or perform backups, so if you're in need of a new program to manage your data we highly recommend it.

Samsung's Slowdowns

I was about to drop the hammer and purchase a 1TB Samsung 840EVO SSD until I came across some bad reviews online about slowdowns with older files on the drive. I did some online searching and the problem seems very real. *Maximum PC* is my primary reference to the PC world, so can you give your loyal readers the lowdown on this. What are your recommendations. **—Joe Klein**

THE DOCTOR RESPONDS: This issue is real Joe, and it's apparently caused by how the drive's controller reads the voltage level of the individual cells. According to Samsung, when data is stored in a cell it has a particular voltage, and over time the voltage would change ever so slightly. This caused the drive to have to perform multiple reads on the same cell in order to correctly determine the voltage, thus causing a major slowdown in performance for data that's been sitting on the drive longer than 30 days or so. The good news is Samsung recently addressed this issue with what it calls "Performance Restoration Software," which is a firmware update available on its website. The update process will take up to 15 minutes, depending on the size of the drive. There is a caveat though, which is the "old" data has to be rewritten to the drive in order to function properly with the new firmware, so after the firmware update is applied you will have to sit and wait for that to occur, which could take a while if you have a lot of data on the drive. Also, since it's monkeying with your data, be sure you have a backup of everything on the drive before you begin this process. Other caveats include a lack of support for RAID arrays, and you must have at least 10 percent of the drive's capacity available for the update. Also, the update will fail if you are using an AMD controller, so switch to an Intel, Marvell, or other brand controller if you can before performing the surgery.

Switching CPUs

I recently purchased a loaded PC from Cyberpower including an Intel i7-4770K chip. As this $2,600 rig was being assembled, the Core i7-4790K became available at the same price. From what I understood from Cyberpower, the upgraded CPU came out too late for them to swap it. Can the Doctor tell me if there is a way to swap CPUs without having to reinstall the OS? Or is it possible to safely overclock the 4770k to 4GHz without damaging the chip? And how would I do this? As I understand from one of *Maximum PC*'s articles, the 4790K is essentially a factory-tweaked 4770K. **—Guy**

THE DOCTOR RESPONDS: To answer your question Guy, you can upgrade or install a different CPU without having to reinstall your operating system. In general, as long as you're not changing the motherboard, an upgrade is as simple as removing the CPU cooler and dropping in the new chip (after applying a new coat of thermal paste, obviously). However, because going from one chip to the next in the same socket usually results in a very small and unnoticeable performance delta, we don't recommend it. You usually need to wait at least two generations for an upgrade in order to achieve noticeable improvements, so for example if you went from Sandy Bridge to Ivy Bridge you would not see much improvement. However, if you were to upgrade from an older Nehalem CPU to Haswell, you would be stunned at how fast it feels, at least at first, before you adjusted to your newfound horsepower. That said, you can upgrade to the Core i7-4970K, but the delta between it and the 4770K would be so small that it's not worth your time or money. That 4770K should last you at least a few years, so it won't be until Skylake and beyond that you should even think about your next upgrade. As far as overclocking goes, yes, you should be able to get that CPU up to 4GHz very easily in its Turbo Boost mode. Most of the 22nm Intel parts can reach 4.2GHz or so just by fiddling with the BIOS, and since it's a K-part, it's already "unlocked," so it should be quite easy. How you actually overclock it varies according to your motherboard model, so use the Google to find one to help you out with that. You shouldn't need extravagant cooling either, so a simple and efficient CPU cooler such as the Cooler Master Hyper 212 should be sufficient. ⏻

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Windows 10 Starts Again

Microsoft brings back some old favorites before looking to a cloud-first, web-first future

BY GRAHAM BARLOW & DAN GRABHAM

Screw everything, we're going straight to 10. Microsoft has announced the successor to Windows 8, and we can't help but be reminded of the classic Onion.com satire of the mindless razor-blade arms race (if you haven't already read it, get googling). The obvious next step in the chronological sequence of Windows versions has been unceremoniously defenestrated. There will be no Windows 9.

"I think we'd all say that Windows is at a threshold," said Terry Myerson, executive vice president of the Operating System Group at Microsoft, introducing the new Windows 10 while making a joke about the well-known codename for the new OS. "And now it's time for a new Windows."

In fact, "Windows 9" wasn't even in the running. Even Windows 10 wasn't the software goliath's first choice.

"Considering our One Microsoft strategy," said Myerson, "the names of our products like Xbox One, OneNote, and OneDrive, it's obvious what the name should be: Windows One. But unfortunately, Windows 1.0 has been done by the giants that came before us [Bill Gates and the original version of Microsoft Windows], and because we're not building an incremental product, the new Windows is Windows 10."

So, is Windows 10 a leap worthy of its name? Take a superficial glance and what you'll see looks suspiciously like Windows 8 with a Start menu. But is it really that simple? Is Windows 10 merely what Windows 8 should have been already? Or is there more to it than meets the eye?

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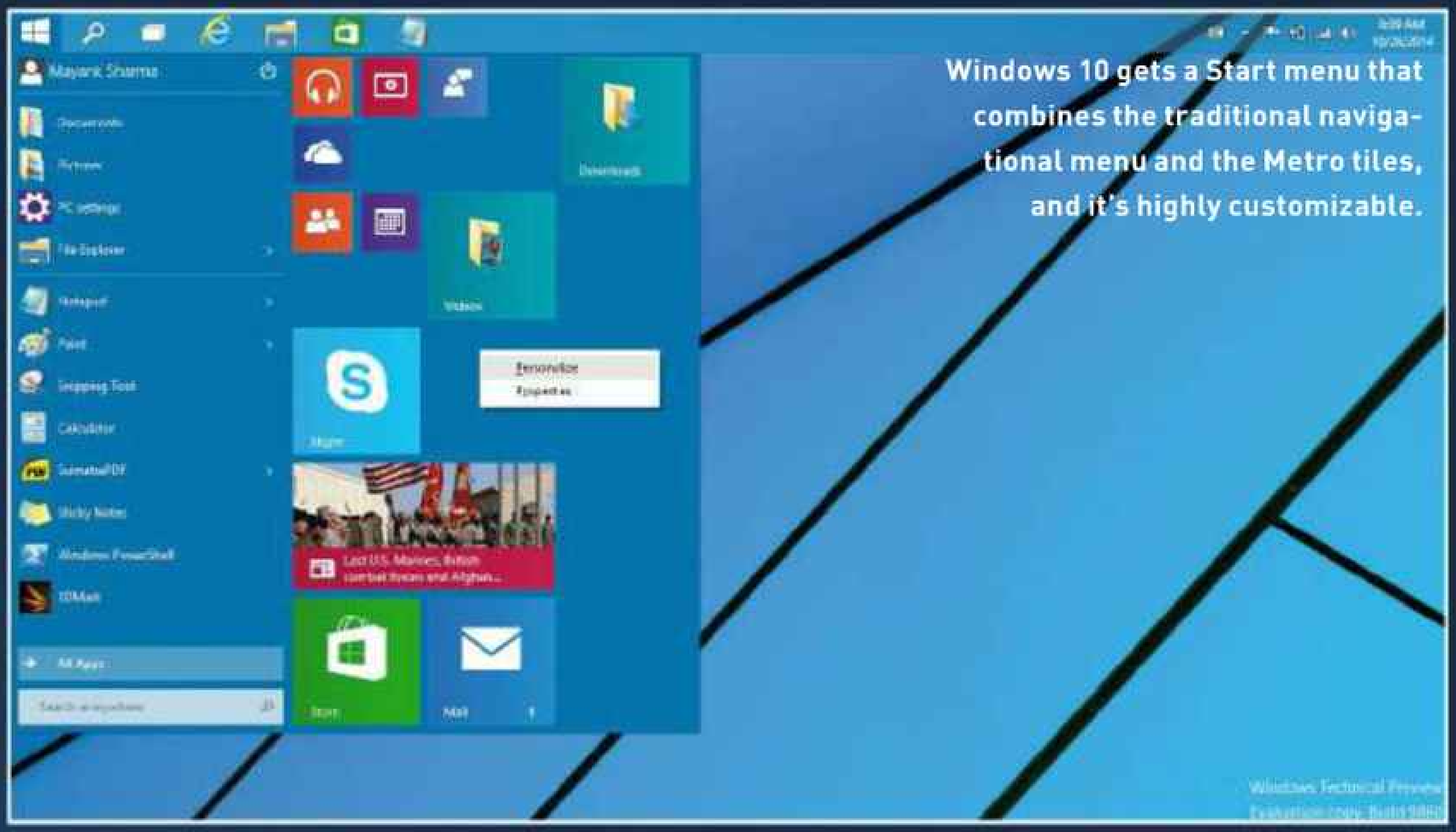
FLEXIBLE AND ADAPTABLE

Has Microsoft finally nailed its "one product family" approach, with an OS designed to perform on a vast range of devices?

This time, it looks like Microsoft is getting it right. For a start, Windows 10 will run on a wider range of devices than any previous version of the OS—from tiny gadgets, to smartphones and tablets, all the way up to desktop PCs. In effect, the new OS is a continuation of Microsoft's much criticized "Windows everywhere" strategy, which stands in stark contrast to Apple's use of separate OSes for different devices—OS X for desktops and laptops, and iOS for tablets and smartphones.

After some trial and error, it seems the company may have hit the mark by giving users of Windows 10 an experience truly tailored to the type of device they're using. Touchscreen features on touchscreen devices, and traditional desktop visuals for devices that come with mice and keyboards, in other words.

Microsoft's "one product family" approach has benefits for developers, too. They'll now be able to write an app just once and have it run on a whole range of devices, with everything available from one store.


Windows 10 gets a Start menu that combines the traditional navigational menu and the Metro tiles, and it's highly customizable.

Down to business

But the real targets for this first look at Win10, the Technical Preview build, are what it calls "enterprise users." No, it's nothing to do with *Star Trek*. Microsoft wants to persuade the legions of businesses currently using Windows 7 to upgrade to Windows 10.

Many firms held off upgrading to Windows 8 due to the radical changes. With Win10, Microsoft aims to create an immediately familiar experience, whether you're used to running Windows 7 or 8. That means some of the staples of Windows 7 (including the Start menu) have made a welcome return. It also means that Windows 10 will be backwards compatible with all the apps you're running now.

The new Start menu looks like a hybrid of Windows 7 and 8. All the familiar items from Win7 are there, including jump lists, All Programs (now All Apps), and Search (which now also hunts the web). There are also new additions, such as a simple power button and a "Me" tile. Most impressive is a new sidebar that's like a miniature version of the Win8 Start screen, complete with Live tiles. The new Start menu is highly customizable, too. You can change the size of tiles, and make the whole menu bigger or smaller.

Win10 also solves the issue in Win8 where Modern apps would run full screen, but traditional apps would exit to the desktop. Now all apps can run inside traditional, resizable windows on the desktop. They snap to the side when you move them, too, so it's easy to keep your desktop looking neat. In fact, there's a new feature called Snap Assist that suggests other open apps you might like to snap as well. Again, all these features are designed to make Win7 users feel at home, with a Taskbar and Start menu always visible.

Windows manager Joe Belfiore was the first person to demonstrate Win10. "We want all these Windows 7 users to have the sentiment that yesterday they were driving a first generation Prius, and when they got Windows 10 they didn't have to learn to drive something new, but it was as if we got them a Tesla," he explained. From our initial look, we'd say that's a fair analogy. It's different, but works in a familiar way.

> “With Windows 10, Microsoft aims to create an immediately familiar experience, whether you're used to running Windows 7 or 8.

Multitasking

It's no coincidence that productivity and multitasking are areas where Apple's iOS mobile devices are often criticized, and that's clearly why they form a key part of Microsoft's vision for Win10. A new button (currently called Task View, although its final name may change) lives in your taskbar and

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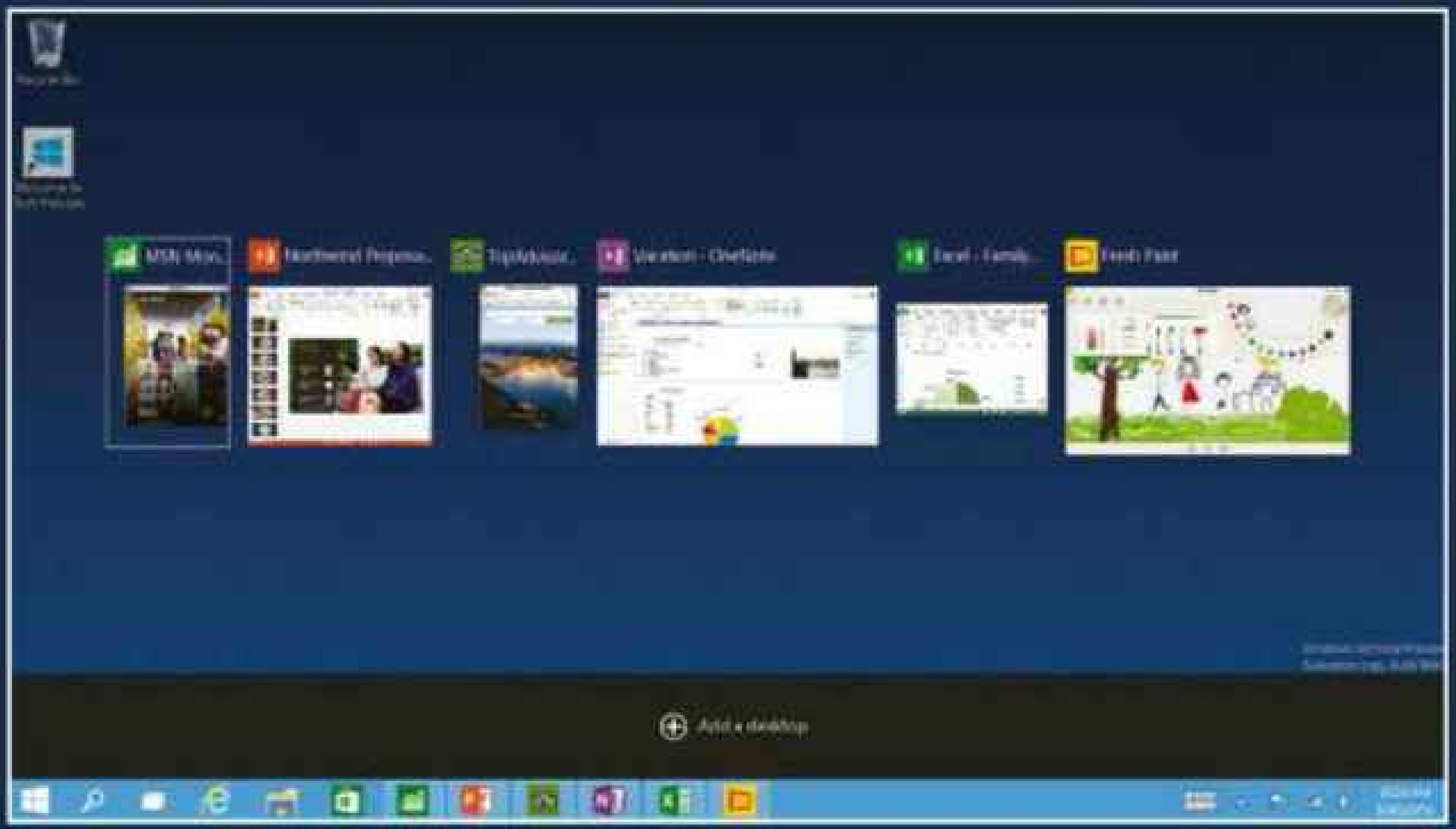
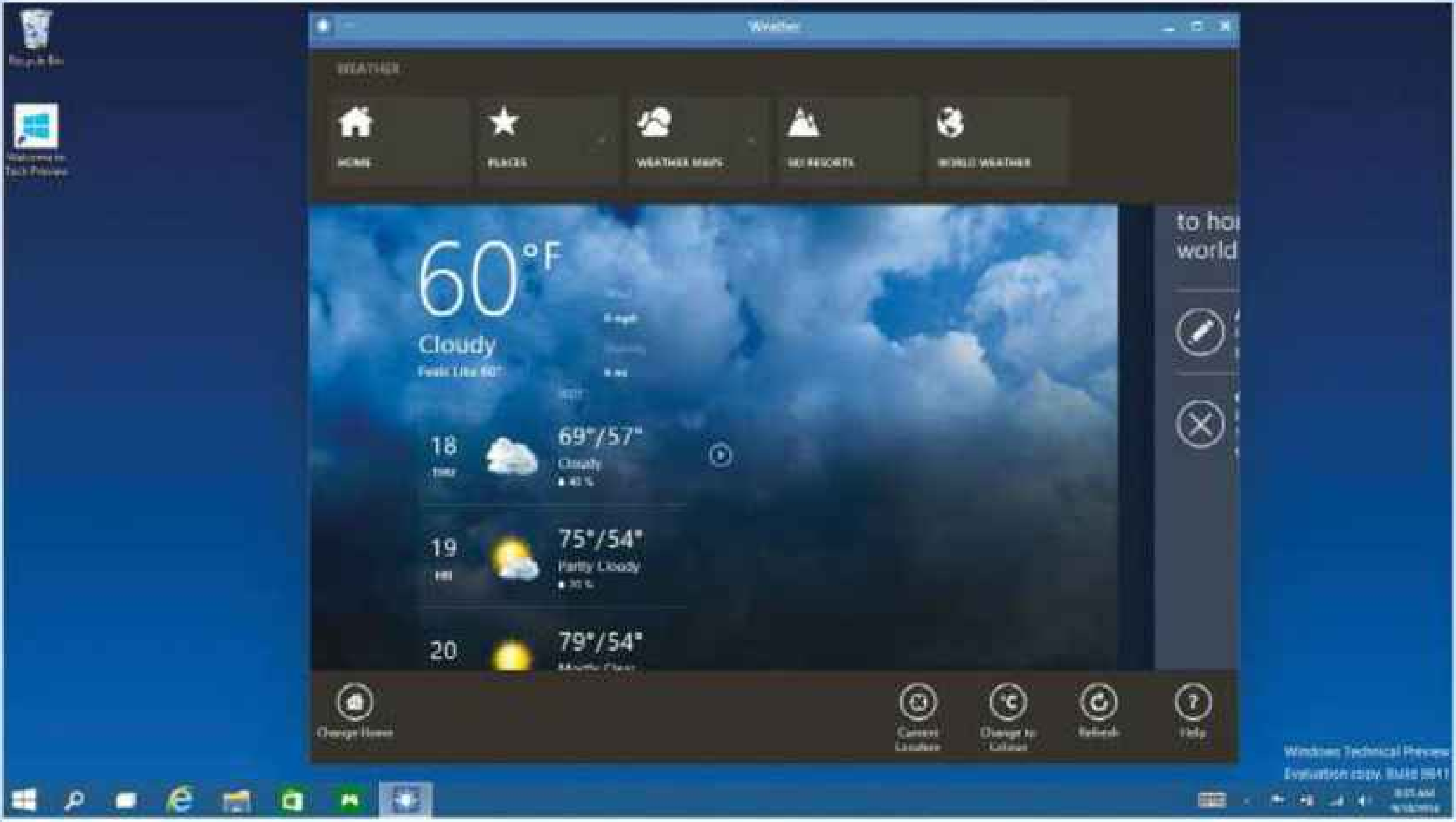


A new feature called Continuum enables Windows 10 to switch its mode of operation for 2-in-1 devices, changing views depending on whether you're using it as a tablet or desktop.



shows live thumbnails of all your running apps on one screen. OS X users will be reminded of Exposé on Macs and Macbooks.

Microsoft has also added another feature familiar to Apple users—multiple desktops. These are accessible from Task View, and are a way to organize all of your open apps—so you could have one desktop with all your financial apps open, another for web browsing and email, and so on. Microsoft hasn't forgotten users with keyboards, either. Win10 makes some improvements to the traditional way of switching between apps with the classic Alt+Tab keyboard combo. Now it switches between virtual desktops as well as between apps.

There's even something for hardcore devotees who use the Command prompt (accessible by typing "cmd" into the Search bar) to perform tasks. Now you can use Ctrl+C and Ctrl+V to copy and paste text to and from the command prompt.

One for all

Belfiore conceded that all these little tweaks aren't groundbreaking, but once you start to put them all together, Windows becomes a lot more usable, which has been the chief criticism of Win8 so far. We'd agree, but the real test is how Win10 is going to perform on the vast range of devices it's designed for—everything from touchscreen phones and tablets to laptops and full desktop systems.

With that in mind, Microsoft has introduced a new feature called Continuum. It enables Win10 to change its mode of operation for 2-in-1 convertible devices, such as the Lenovo Yoga and Microsoft Surface. When you're using your device as a tablet, Continuum gives you an appropriate view for a touchscreen (including full-screen apps and larger Start screen), but when you attach it to a keyboard and mouse, you get a traditional desktop, Start menu, and taskbar. Continuum was actually too new for Belfiore to demonstrate live, but we were treated to a video. It certainly looks promising and finally presents a solution to Microsoft's problem of having one OS work on different devices.

Users of touchscreen devices will also be pleased to hear rumors of the death of the Charms bar have been exaggerated—it's still there if you swipe right. The screen that Belfiore demonstrated looked very much like the old Win8 Charms bar, but he expects it to look different in the finished version.

> All these little tweaks aren't groundbreaking, but once you start to put them all together, Windows becomes a lot more useable.

Second wind

The presentation also contained a rare admission from Microsoft that it missed the mark with Win8 when it came to the idea of productivity on touch devices. "With Windows 8 we didn't get it quite right," admitted Belfiore. "With Windows 10, we think we have a better approach."

As for dates, the "launch wave" looks like it will be mid-2015. Myerson said that early next year Microsoft will "start talking more about the consumer story" and at the Build conference in April, the firm is intending to "continue the dialogue of Universal apps." That's corporate speak for apps that work on multiple devices.

Microsoft also emphasized there are new consumer features coming—more on that in a moment. Once the Technical Preview gets into people's hands, more features already baked-in will no doubt be revealed. For now, while Win10 hardly breaks major new ground, there's enough already here to tempt target Windows 7 users to upgrade. For us, overall judgement will have to wait until we've seen the final version. But for our in-depth test drive of the Technical Preview, a look at the hottest new features due to join the Win10 party at final release, and a few thoughts on what might have been, read on.

HANDS-ON WITH WIN10'S TECHNICAL PREVIEW

Spend some quality time with the preview build of Windows 10

BY MAYANK SHARMA

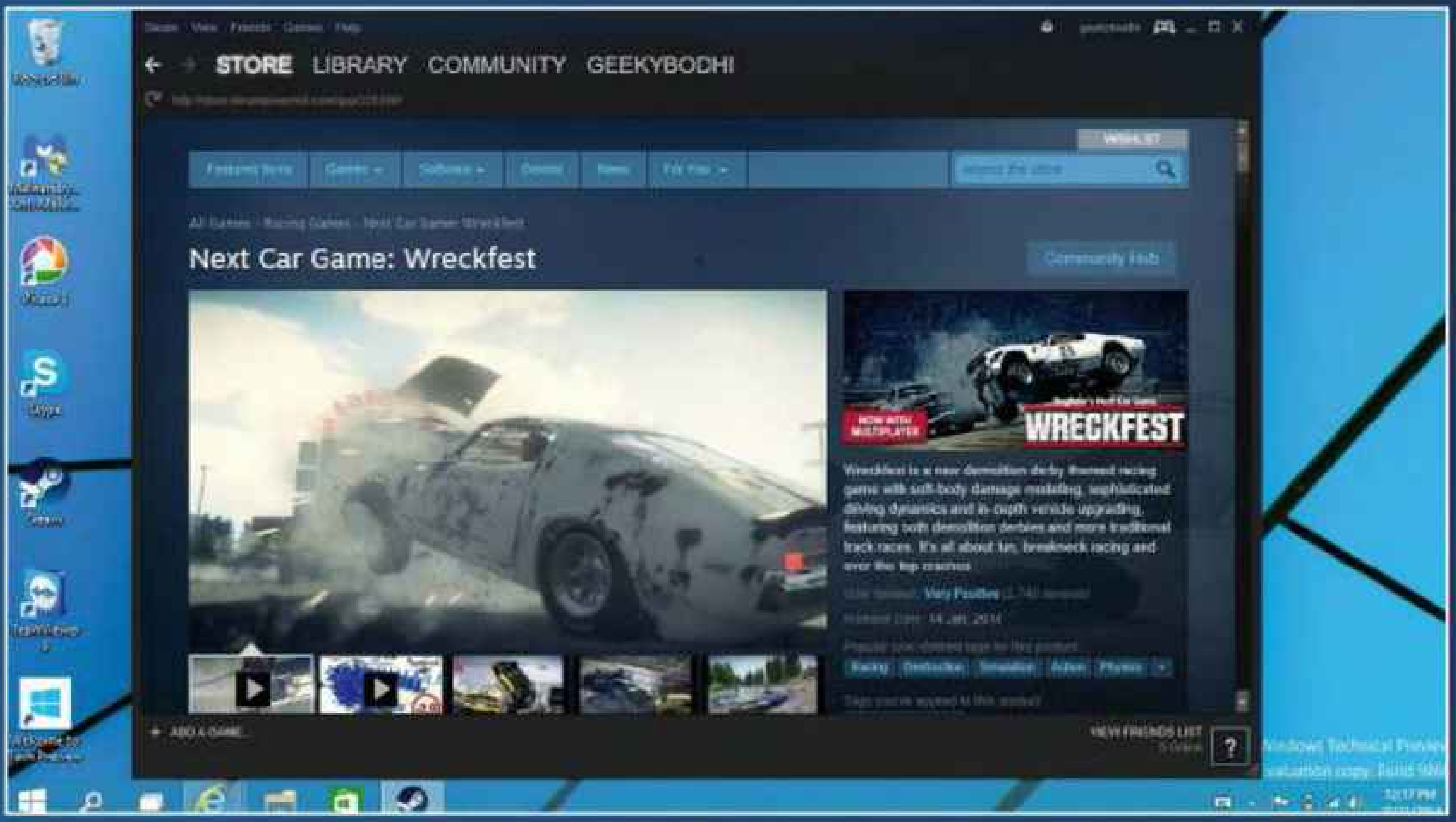
That Windows 10 is a major overhaul is evident from the get-go. There are profound changes from Win8.1, even in this early Technical Preview. For starters, the installation process has been streamlined. You can get through the entire operation without creating a local account, instead authenticating via your existing Microsoft account.

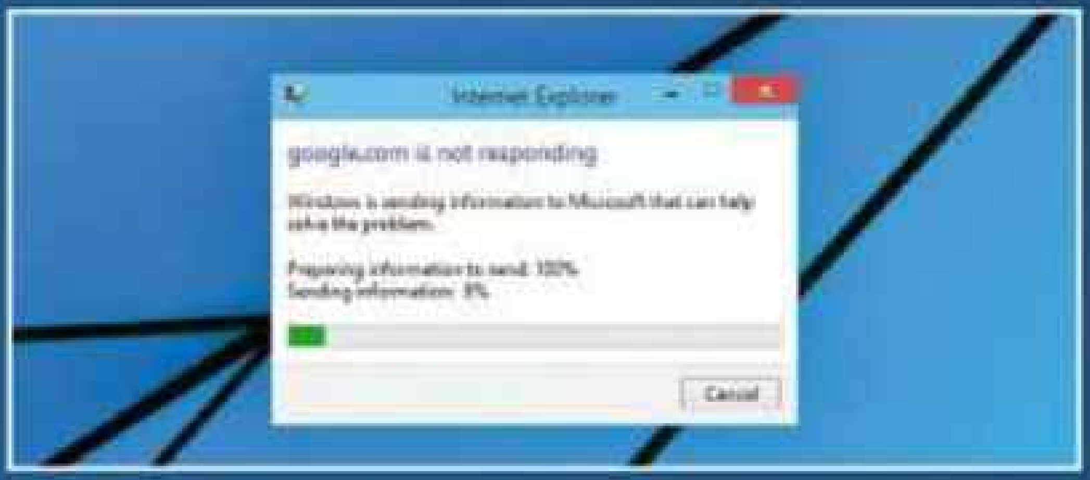
Unlike Win8/8.1, Win10 boots straight into a traditional-looking desktop by default. It has all the elements you'd expect, with icons on the desktop, a taskbar at the bottom, and a fully functional Start menu. Microsoft received a lot of flak for removing the Start menu in Win8. Incrementally, Microsoft reintroduced Start menu-like features into successive builds of Win8, but they were more of a toggle between the Metro and traditional desktop interfaces. For Win10, the Start menu makes a triumphant if belated return.

It's now much more usable, and divided into two panes. The left gives you quick access to the frequently visited locations and used apps, plus can display a list of all installed apps. In a stroke of brilliance, Microsoft has also included tiles on the right. So you get a traditional Start menu to launch installed apps, along with tiles that let you quickly gaze at information gleaned from various online apps. It's basically the best of Win8 combined with everything you were missing from previous versions of Windows. You can also resize the Start menu and pin additional apps and folders, and the search tool has been fleshed out to look up keyed-in text on the Internet, along with local files and data.

Coherent user experience

The desktop simply feels more consistent. All apps—traditional and Metro—run inside a window with all the traditional controls. The whole interface is again designed to be operated with a mouse and keyboard.





google.com is not responding

Windows is sending information to Microsoft that can help solve the problem.

Preparing information to send: 100%
Sending information: 8%

Many people aren't happy with Microsoft collecting error data, but that's the purpose of the TP. See the Privacy Policy for all the details.

There are no touch-based actions that feel unnatural with a mouse. There are no hot corners, and—joy—the trigger for the Charms bar is a goner. But the Charms bar is still available with the Windows Key+C shortcut and will show up in touch-based devices after a quick swipe to the right. In short, desktop users operating a mouse and keyboard will no longer battle with elements designed for touch-based devices.

As for performance, despite its Technical Preview status, Win10 really flies. Boot times are zippy, and even after loading up the OS with apps it remains responsive. There was the occasional hiccup with some software (particularly Internet Explorer) closing unexpectedly. Whenever this happened, the TP collected and sent the relevant information to Microsoft. The new Skype Modern app also failed to sign in, though the desktop app from Skype's website worked flawlessly. We also installed a few other apps, such as Picasa 3, MalwareBytes, and TeamViewer. All worked smoothly. And we had no problem playing ogg files in Windows Media Player after installing codecs from Xiph.org. The one app that didn't work was the VirtualBox emulator, which simply refused to launch.

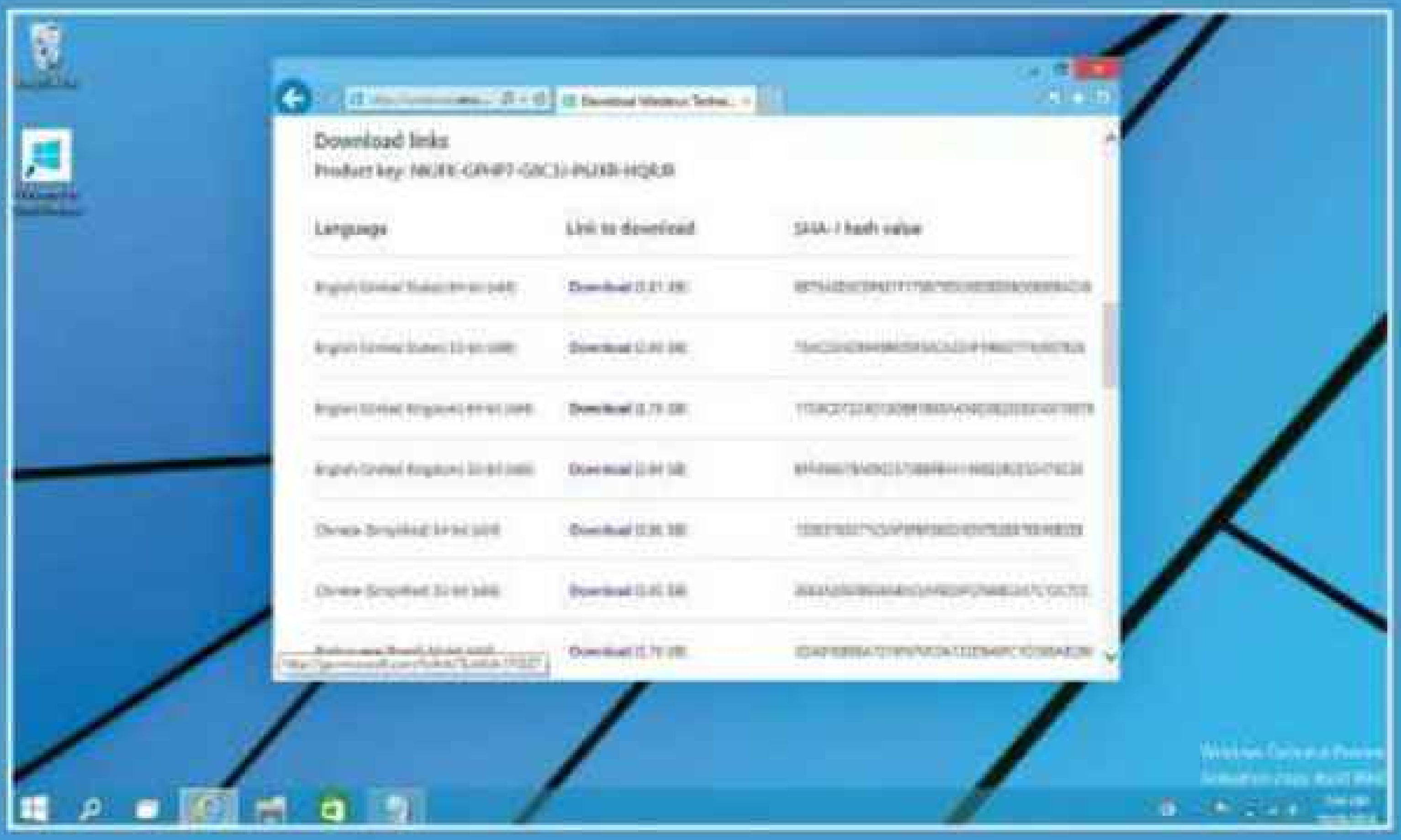
Fully functional

The Technical Preview also got its first major update during our testing. It weighed in at over 2GB, with over 7,000 tweaks. That's a hefty download, but we had no trouble updating. However, on one of our test machines, IE refused to launch after the build update. That machine also had some trouble rendering fonts, but corrected itself with the first update for the new build.

The 10,000-foot view, then, is that Win10 is what Windows 8 should have been—a natural extension of an OS that's moving from an offline environment to an online one.

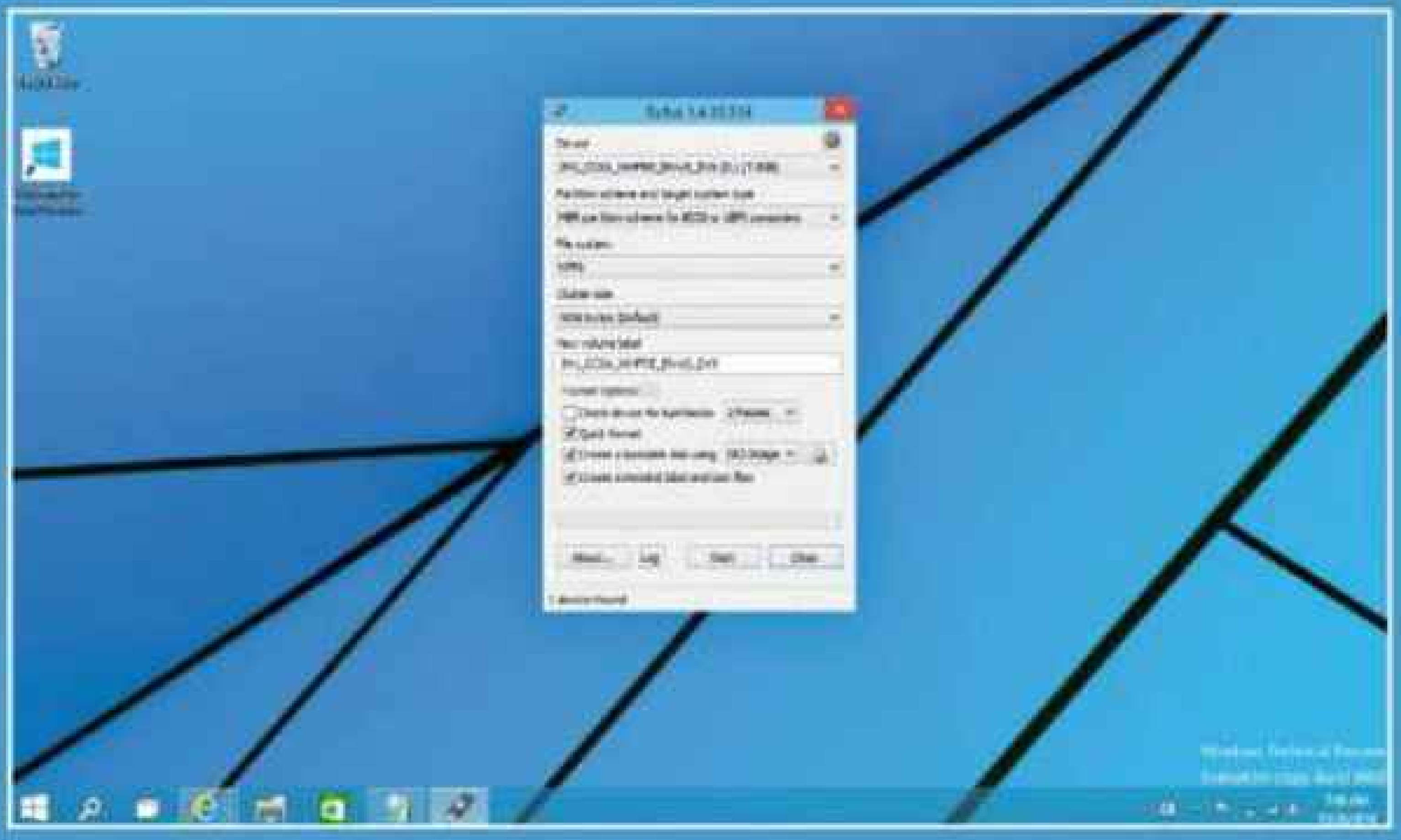
STEP-BY-STEP

INSTALLING THE TECHNICAL PREVIEW



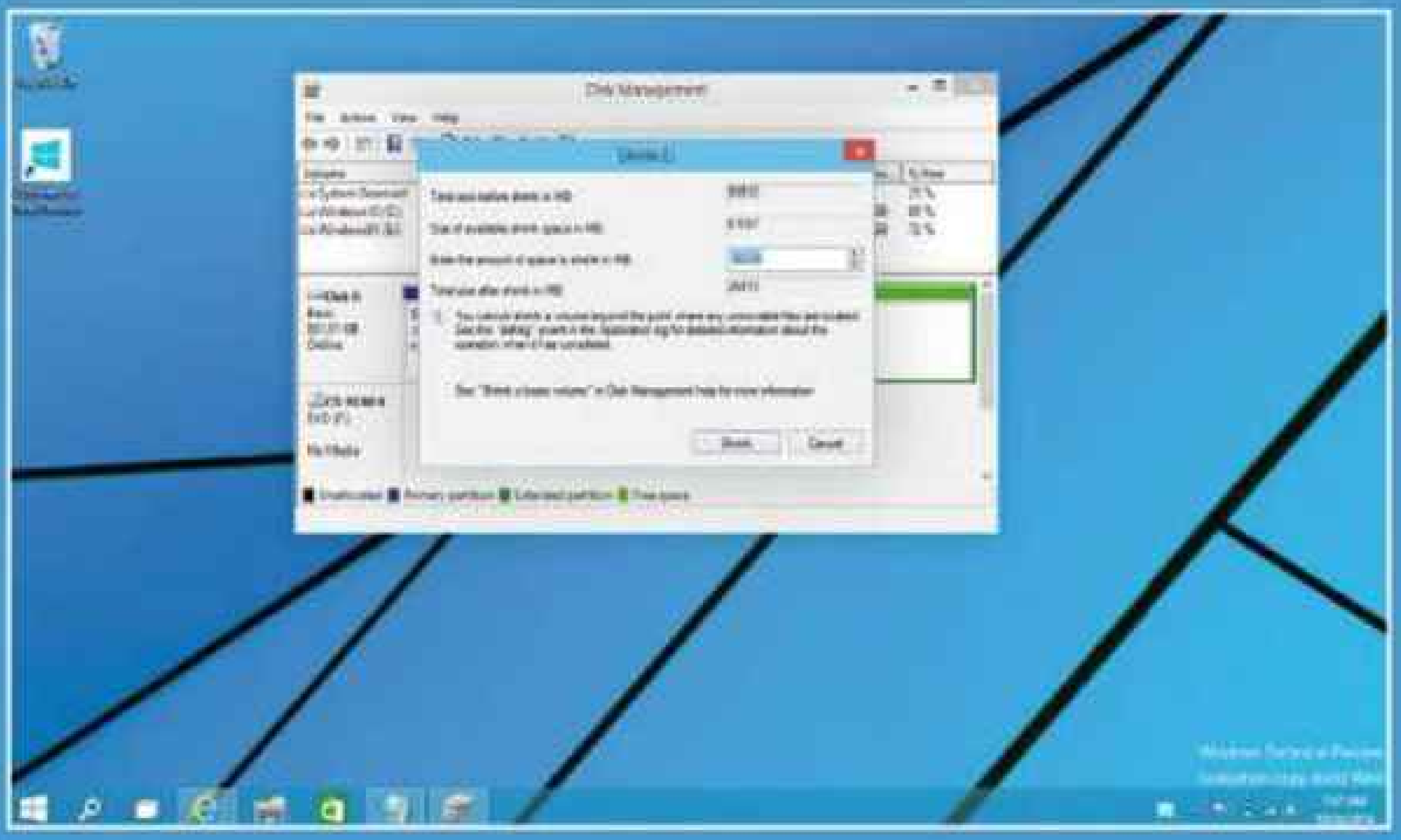
Step 1: Register and Download

Head to insider.windows.com to register in the Windows Insider Program. This gives you access to under-development software and lets you share feedback with Microsoft. You'll then be directed to download one of several ISO files. These contain all of the installation files. There are different ISOs for different languages in both 32-bit and 64-bit configurations. Grab the version that matches your requirements. The ISO file is several GBs and will take some time to download.



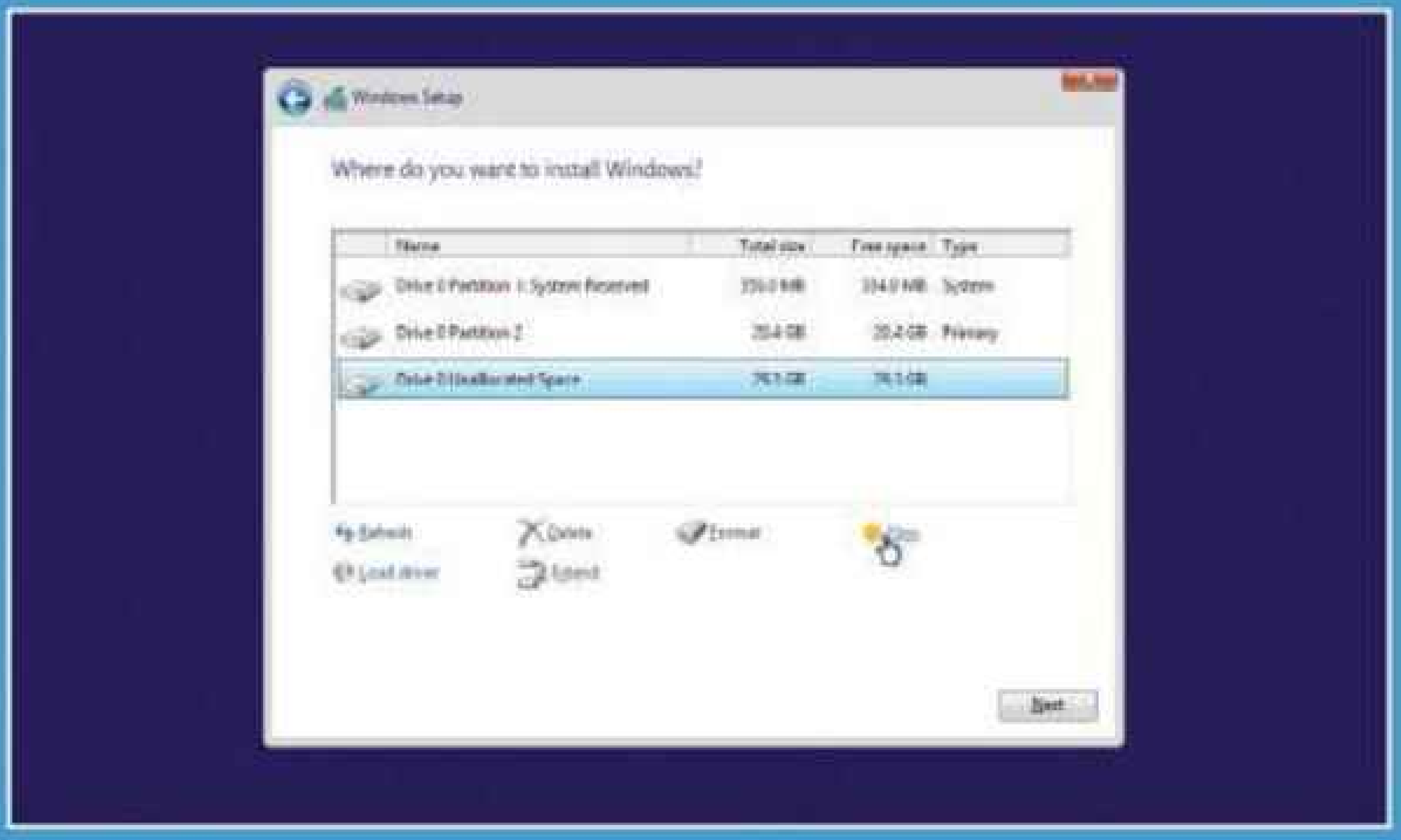
Step 2: Make Installation Media

When the download is complete, transfer the ISO file to installation media such as a USB flash drive or DVD. To make an installable USB drive, visit http://rufus.akeo.ie to download Rufus, then launch it. Plug in the USB drive and Rufus will detect it automatically and list it in the Device field. Now locate the checkbox marked "Create a bootable disk using," and click the drive icon at the far right. Then navigate to wherever you saved the Windows 10 ISO file and select it. Finally, click on Start and wait for 20-30 minutes until Rufus reports "Done."



Step 3: Make Room for Installation

You'll need to make space for Windows 10 if you want to install it alongside Windows 7 or 8 on the same hard drive. You can use the Disk Management utility in Windows 7/8/8.1 to do this. Press Windows Key+R and type "diskmgmt.msc" into the Run dialog to launch it. Locate your Windows partition, which is probably the C: drive. Right-click it and select "Shrink Volume." Windows 10 requires at least 20GB. If you have multiple partitions, you could also choose to resize a different partition to free up space.



Where do you want to install Windows?

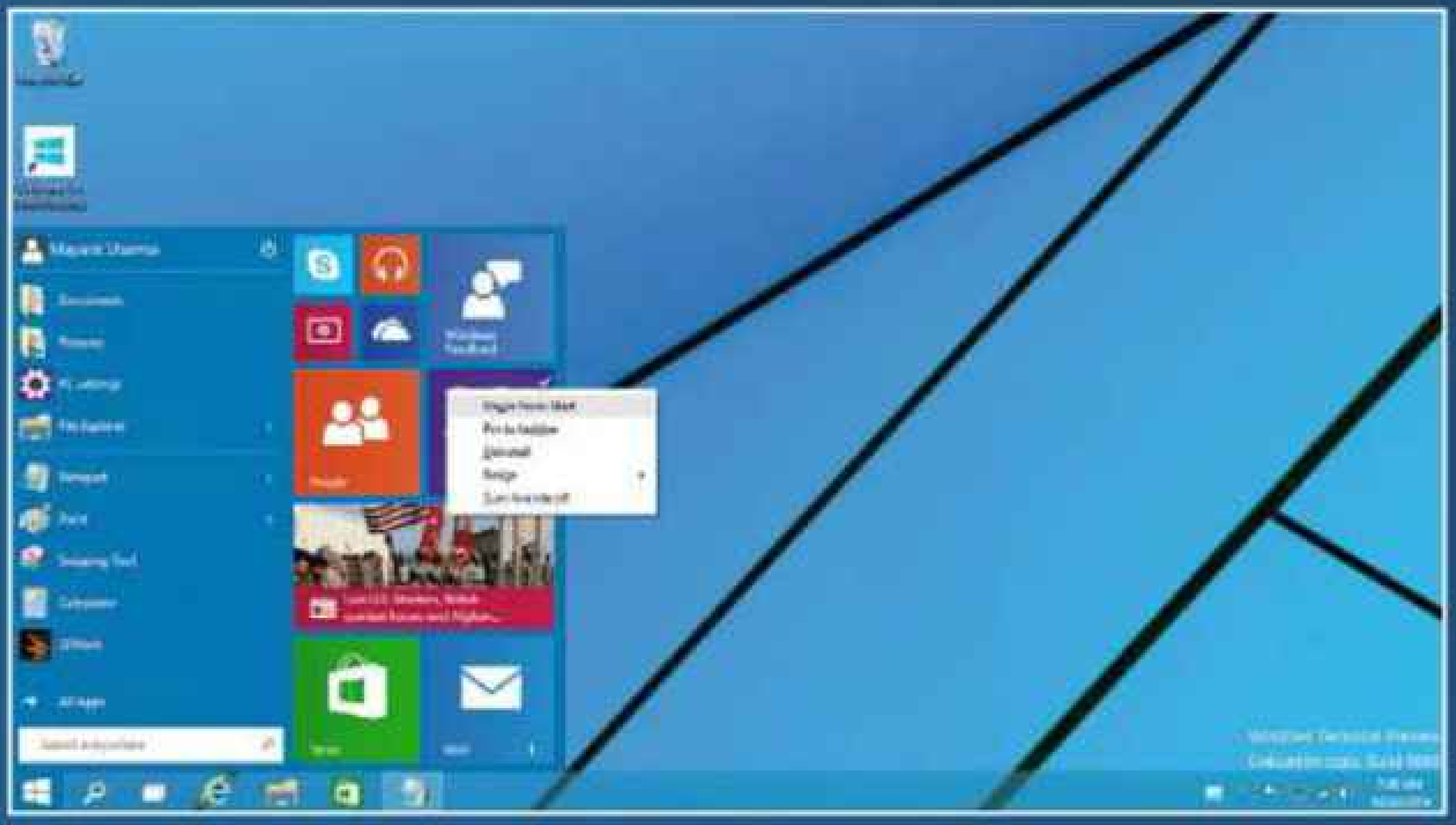
Name	Total size	Free space	Type
Drive 0 Partition 1: System Reserved	350.0 MB	334.0 MB	System
Drive 0 Partition 2	20.4 GB	20.2 GB	Primary
Drive 0 Unallocated Space	79.1 GB	79.1 GB	

Step 4: Launch Setup

Plug-in the bootable USB drive and power up the system. If you have a Win8 computer, hold down the Shift key while you boot your computer. Head to the "Use a device" option to select the USB disk. This should start the Win10 setup process. When prompted, click the "Custom: Install Windows only (advanced)" installation option. In the following screen you'll see an "Unallocated Space" option, which is the space you freed up. Select it and click "New" to create a new partition in the empty space. Then click "Next" to install Windows 10 on that new partition.

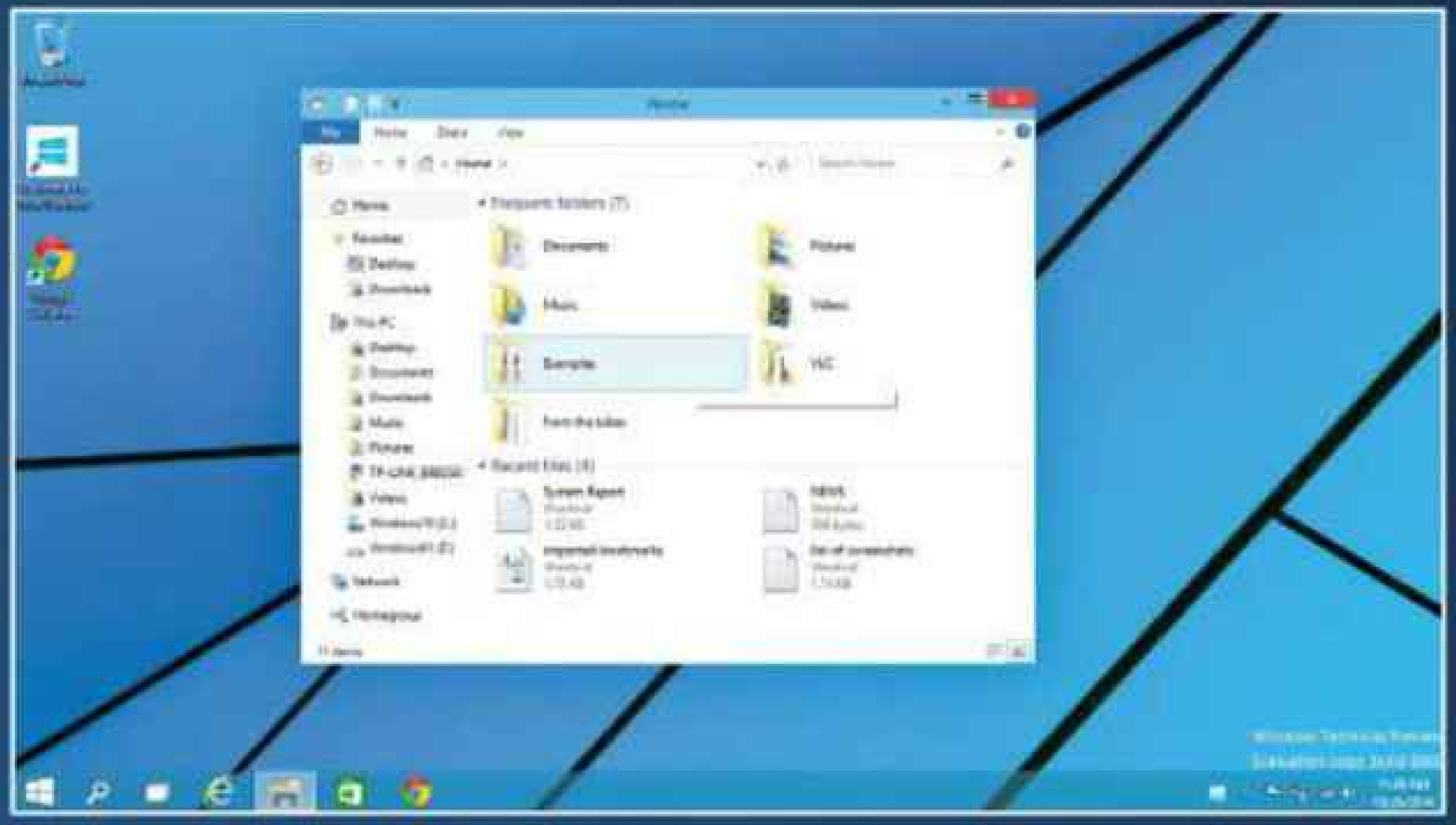
WINDOWS 10: SIX KEY FEATURES

Microsoft's biggest, most exciting innovations that really stand out in the Technical Preview so far



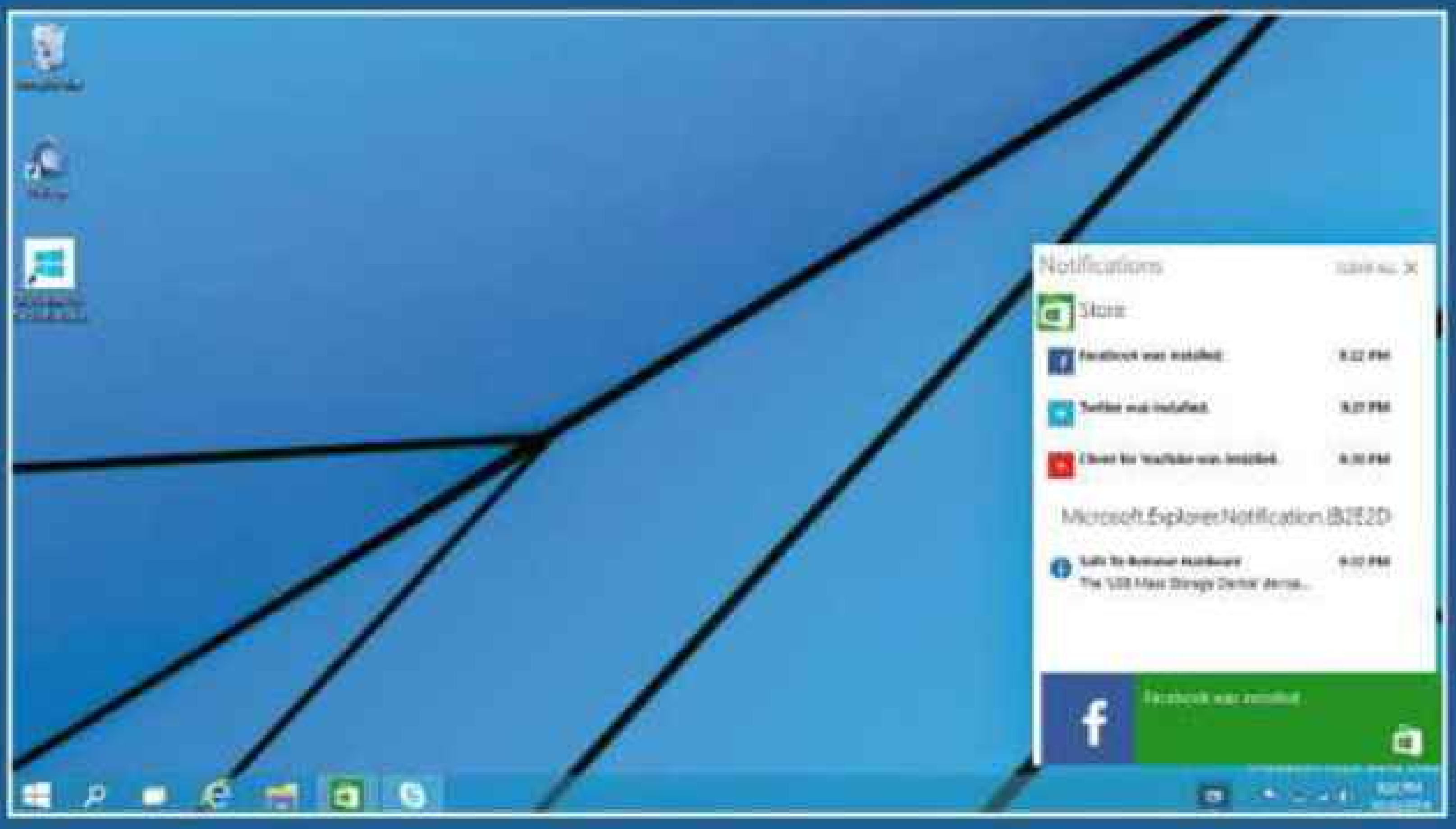
Modern Start Menu

Two years after forcing the Metro Start screen on desktop users that interact with mouse-and-keyboard devices, Microsoft has finally given in. Windows 10 will boot into a traditional desktop that has the Start menu in its familiar location. But kudos to Microsoft for cleverly integrating tiles into the traditional Start menu. The left of the new menu is similar to the standard Win7 Start menu, but the right side is populated with Metro-style live tiles. The Search bar in the menu has also been taught new tricks and can now search on the web as well.



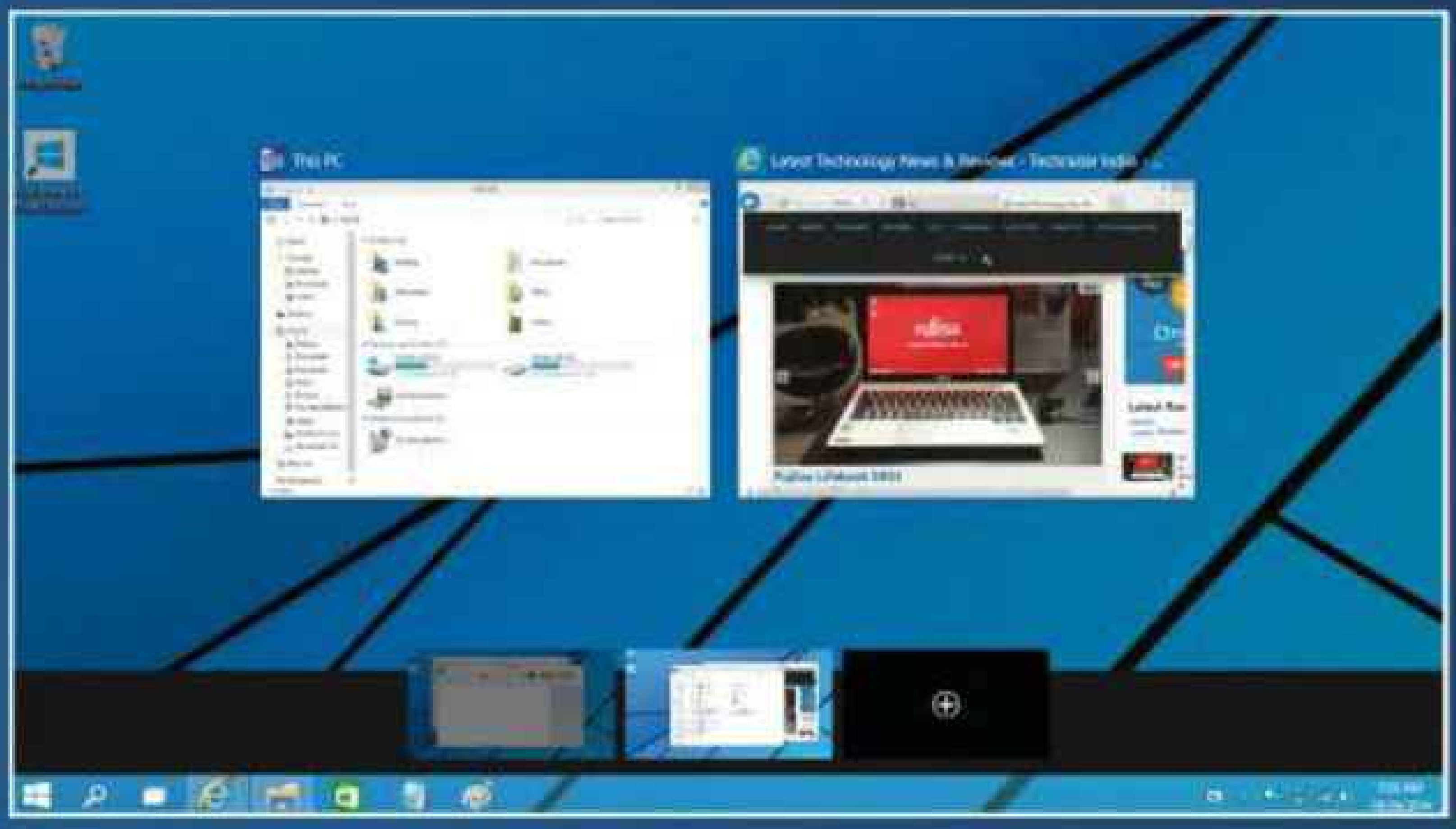
New Home

The Win10 File Explorer defaults to a new tab labeled Home. Unlike earlier versions—when opening My Computer or an Explorer window would show you the PC's local storage and network locations, along with shortcuts to default folders such as Documents—the new File Explorer lands on the new Home view. This is divided into Frequent folders and Recent files. The left-hand menu lists the "This PC" option for managing the storage locations, along with the "OneDrive" option that lists content on the cloud storage service.



Notification Tray

This feature wasn't available in the original Technical Preview, but was part of the 9860 build update. The desktop retains the top-right corner toast notifications from the previous release, but a new notification tray has been added. Microsoft calls it the Action Center, and it bears a striking resemblance to Windows Phone 8.1's Action Center. You can find it via a new icon in the notification area of the taskbar. It's currently a very rough implementation with only basic notifications, but a cleaner interface and quick actions are expected.



Virtual Desktops

Virtual desktops have finally been added. If you open a lot of programs at once, this lets you organize them under several virtual workspaces. The feature is called "Task View" and can be activated through the taskbar. When clicked, it brings up the Task View interface, where you can see your open windows on virtual desktops. Initially you only have one desktop, so click the "Add a desktop" button to create more. Program windows open on your desktops will show inside the thumbnails of the desktops on the Task View interface.

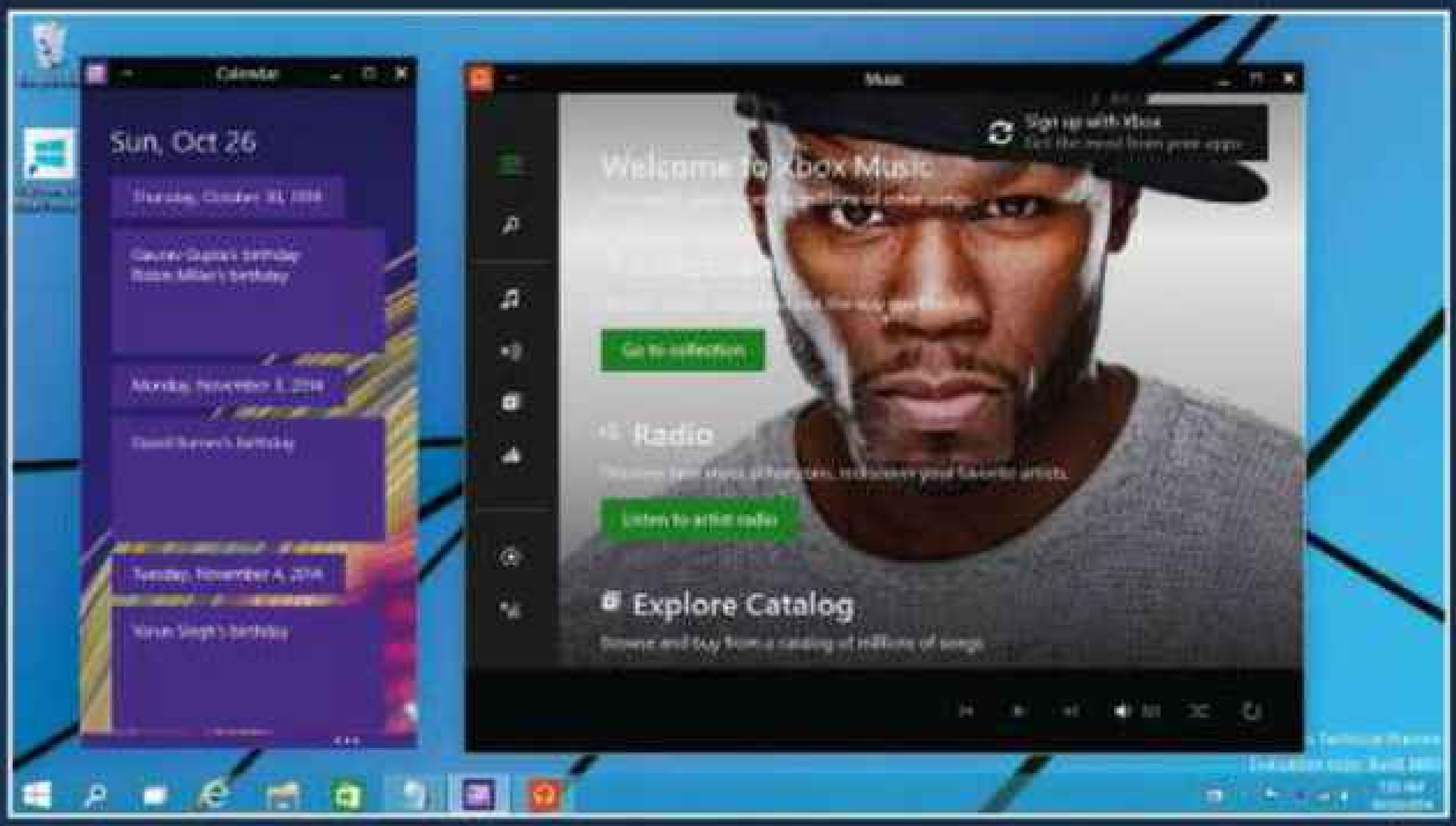
BENCHMARKING THE NEW BUILD

For an OS still more than half a year away from general availability, Win10 is pretty solid. For everyday tasks it feels as responsive as Win8.1, and surprisingly came out on top in the benchmark tests.

We tested both the Technical Preview and Win8.1 on a laptop with a 2.1GHz quad-core AMD A8-550M APU with Radeon HD8550G graphics and 8GB of RAM. We used the Boot Racer app to measure boot-up times. While 8.1 took 93.3 seconds to boot to a usable desktop, the TP took just 51.6s.

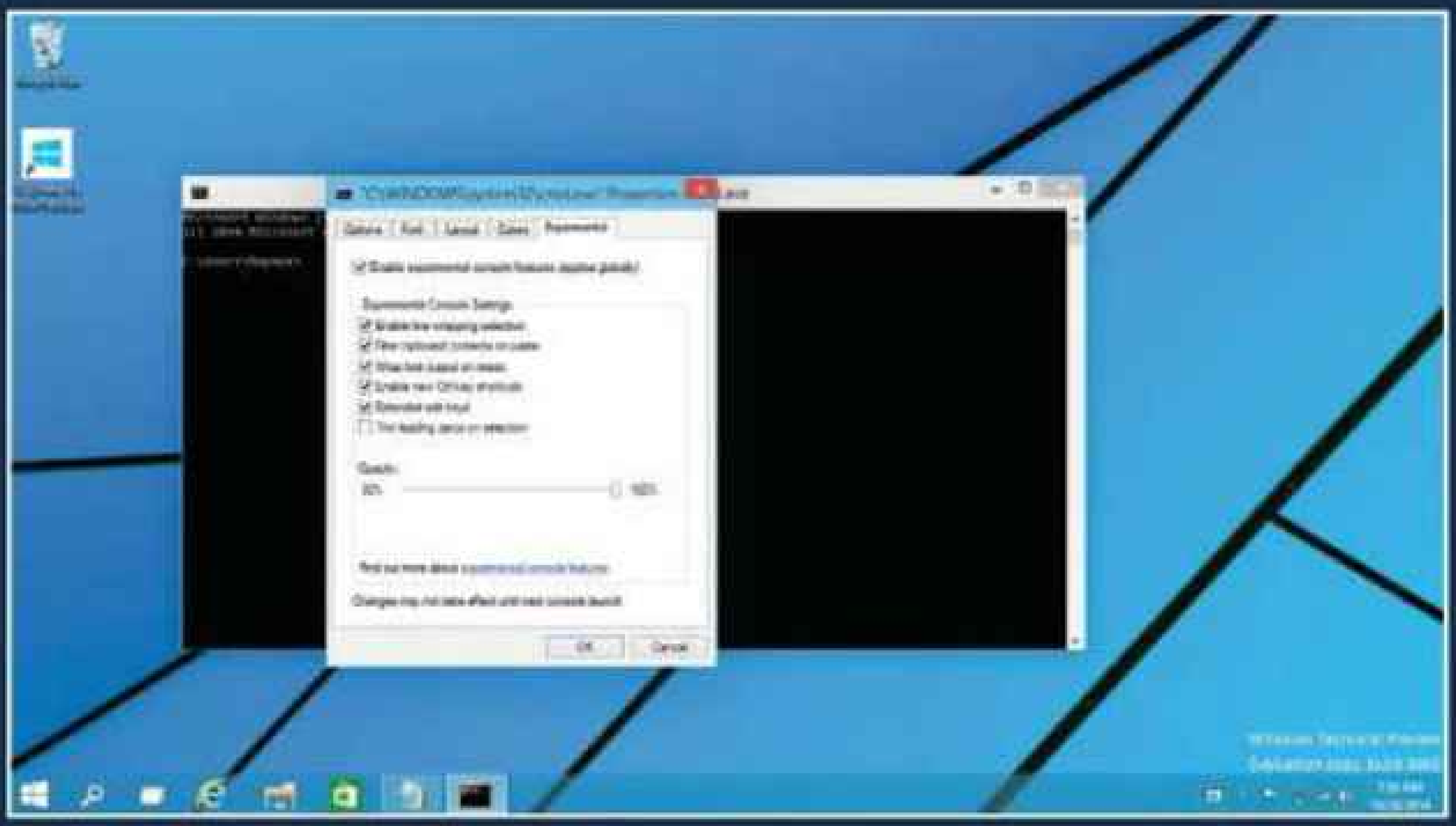
Next up we measured memory bandwidth with SiSoft Sandra. Once again, the TP at 7.51GB/s outpaced 8.1, which clocked in at 5.45GB/s. We then used Cinebench. In the CPU test, 8.1 scored 89, while the TP scored a whopping 151. The OpenGL results were a lot closer, with 8.1 generating 16.45fps and the TP only marginally faster at 17.50fps.

To test their gaming capabilities we benchmarked with 3D Mark. Despite TP lacking DirectX, it consistently outscored the DirectX 11-equipped 8.1. In the *Cloud Gate* test, 8.1 scored 2,072 while the TP aced it with 2,619. Similarly in the *Sky Diver* test, 8.1 scored 1,907, and was again outpaced by the TP at 1,973.



Consistent Desktop Experience

Win10 also presents a more coherent desktop experience. Instead of forcing you to use the new Metro apps in full-screen, Win10 lets you run them inside a window, like traditional desktop apps. Then there's the Continuum mode. It seamlessly switches the interface between a desktop and tablet experience to cater for both touch-based devices and mouse-operated computers. So if you've a device such as the Surface tablet, it'll run in the desktop mode when the keyboard is attached and switch to tablet mode when the keyboard is detached.



Updated Command Prompt

One addition that'll surely interest administrators is the refinement of the Windows command-line, which has been taught a lot of new tricks. It now supports native text selection and can wrap lines. The command-line also has the ability to quickly paste text into the command prompt using the Ctrl+V key combination. There are a whole lot of other hotkeys for moving the cursor and selecting text, too. Bring up the Properties dialog of the command-line window to explore other functions.

> Win10 is pretty solid, and surprisingly came out on top of Win8.1 in our tests.

An early look at Windows 10 proves Microsoft has remembered what's important for desktop diehards. Like us. Great! You might say it's also about time.

SETTING A HIGHER STANDARD

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Inverted

90^0 Inverted

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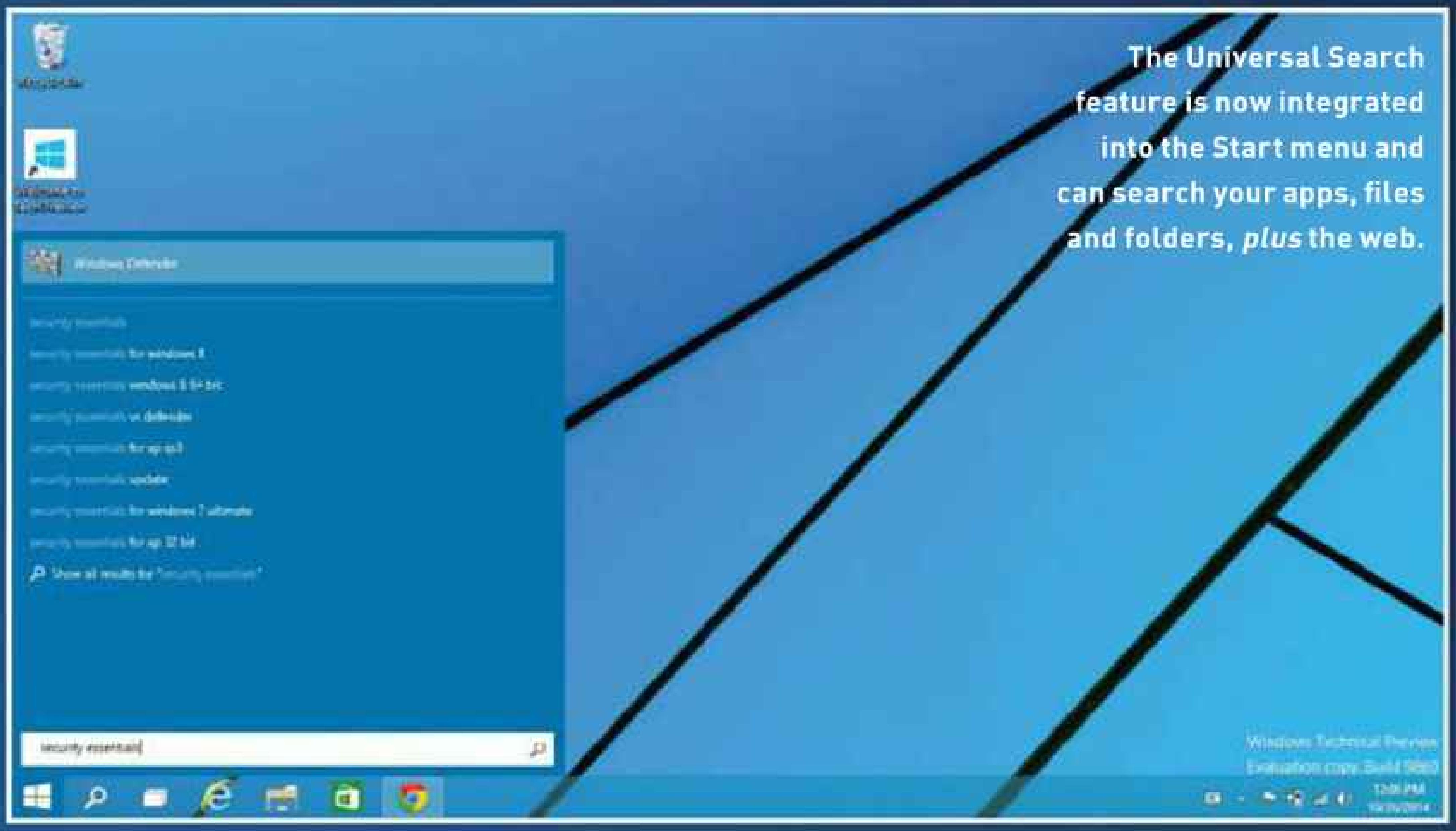
INTO THE FUTURE OF THE NEW OS

What's defintely coming and what we hope makes the Win10 cut

Windows 10 is currently under active development and the final release isn't expected until mid-2015. So while it would be unfair to judge the OS based on October's Technical Preview, it does give us an idea about the core consumer areas Microsoft hopes to focus on and improve in its latest OS.

Since the release of Win8, Microsoft wants to bring the Internet closer to the desktop with features such as Live tiles. Win10 extends this initiative with the Universal Search feature built into the new Start menu. It's powered by Microsoft's Bing search engine, and it'll be interesting to see if the company adds other sources for this feature to pull data from. A related development is the expected overhaul of the security mechanisms, for both home and enterprise users. You'll have a choice of authentication methods, including the ability to use your smartphone as a key to gain access to the computer.


Windows Defender
security essentials
security essentials for windows 8
security essentials windows 8 64 bit
security essentials vs defender
security essentials for xp sp3
security essentials update
security essentials for windows 7 ultimate
security essentials for xp 32 bit
Show all results for "security essentials"
security essentials
Windows Technical Preview

The Universal Search feature is now integrated into the Start menu and can search your apps, files and folders, *plus* the web.

Win10 will also be far more customizable. The new Start menu can be resized and you can pin all sorts of items including apps, folders, and even files to the menu and the taskbar for quick access. In fact, it will bid adieu to all of the Win8/8.1 designed-for-touch issues. Mousing right no longer brings up the Charms bar. Metro apps (now Universal apps) have a special menu in the top left corner, to access functions that used to be available through the Charms bar, such as Share and Search. There's no hot corner for task switching, either. Win10 instead promotes the use of virtual desktops.

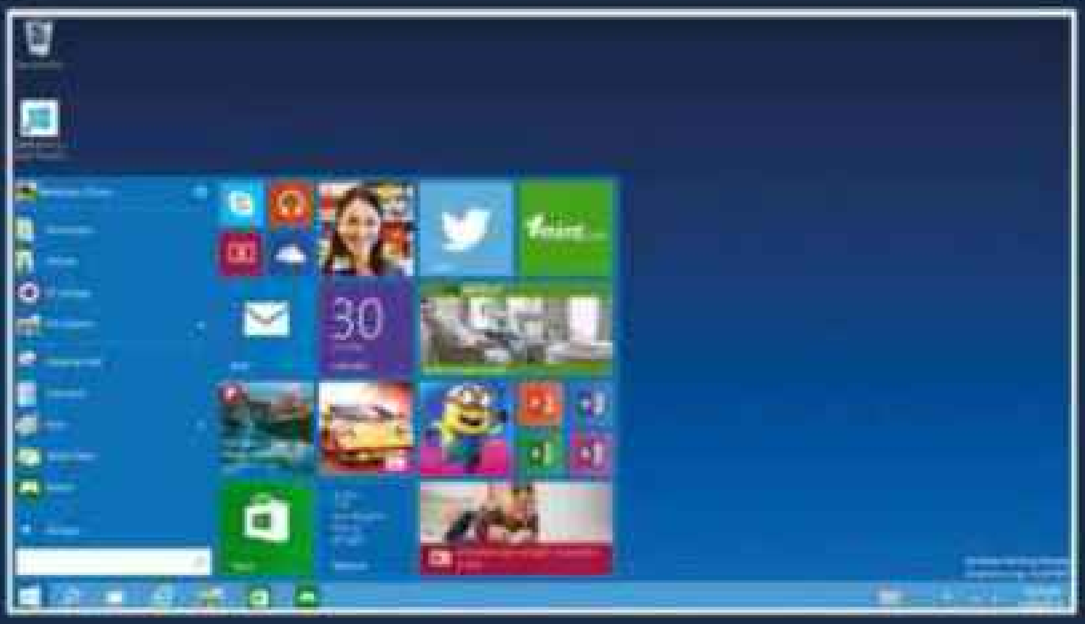
Windows Technical Preview
Evaluation copy. Build 9841
10:24 AM
9/30/2014
enter
shift
Bang & Olufsen ICEpower

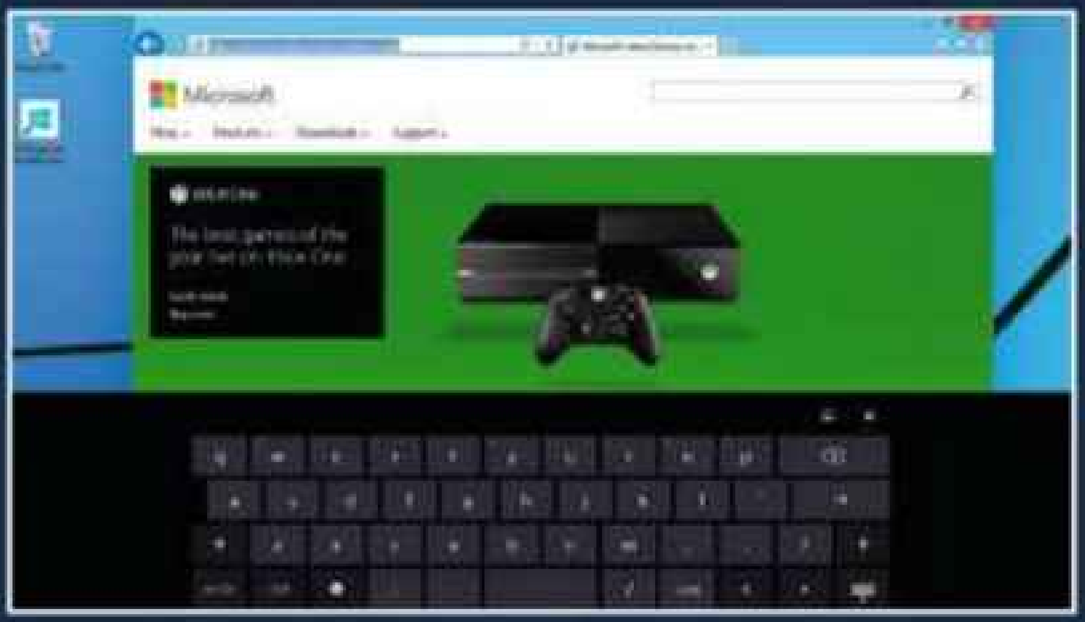
The Charms bar has been hidden on desktops, but can still be easily accessed on tablets with a right swipe.

Starting over

As we've said, instead of one interface, Win10 will deliver Continuum. That's separate interfaces for desktop and touch plus the ability to change mode on the fly. In theory, Continuum will give us the best of both worlds and do so automatically. While it's at it, Microsoft should also fix another consistency issue introduced in Win8. Over the years, Microsoft has tried to make the Control Panel more accessible to new users. But for a fluid experience, the new simplified PC Settings app needs to be better integrated.

Another hot new feature for Win10 is the inclusion of the Cortana digital assistant that's currently only available on the Windows Phone platform. According to the latest Win10 scuttlebutt, Cortana will be integrated into the Search app, which has its own icon next to the Start menu. There's no official word on its





When using Win10 on touch devices, it'll automatically display a virtual keyboard.

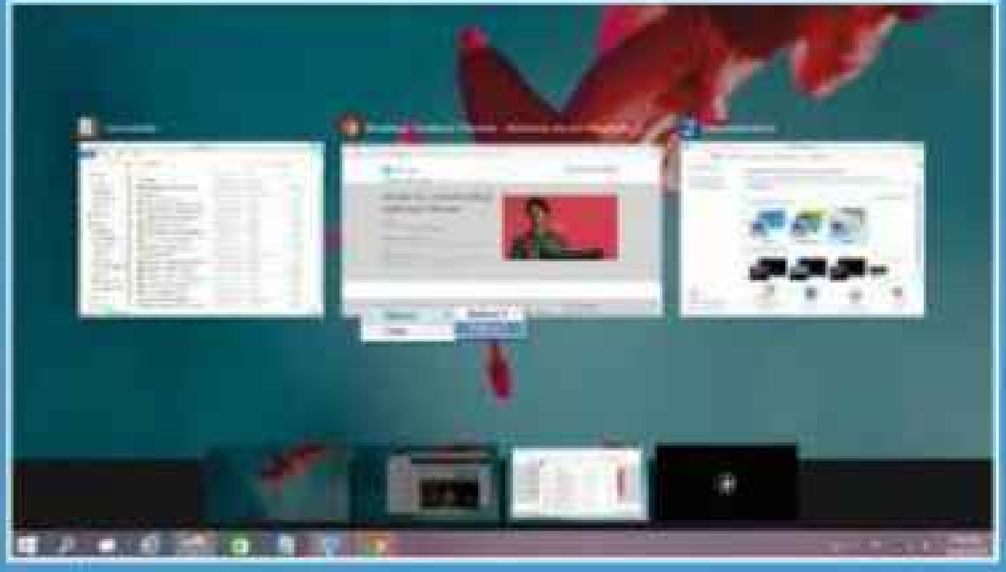
implementation, but we expect users will be able to either type a request or use voice commands to tell Cortana what to look for. There's also good news if you're a gamer. Windows 10 will ship with the DirectX 12 graphics API that promises to significantly improve performance.

The big idea with DX12 is reducing CPU overheads so that games run as efficiently on Windows as they do on dedicated consoles. Arguably it's a response to AMD's Mantle graphics API. Whatever, it could be the killer feature for gamers.

We're also expecting Win10 to have some of the flashy bling that was cut in Win8. There are already some drop shadow effects. Could we see a return of the Aero Glass effect or something like it? A few optional bells and whistles wouldn't hurt. The new OS is also set to have flatter iconography, much like the icon for the new File Explorer.

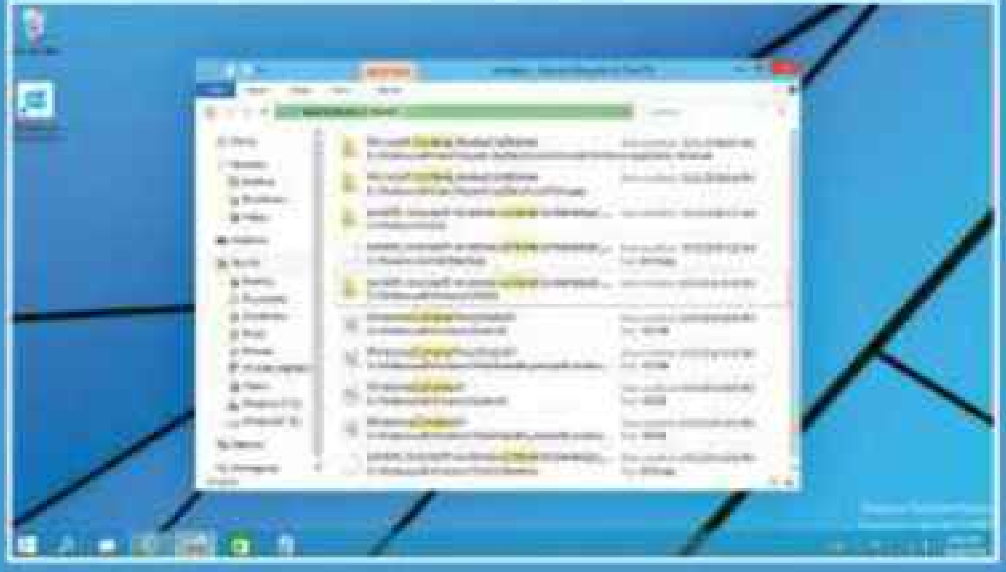
The company is also overhauling its infrastructure for delivering updates. Some users are going further and calling for Microsoft to make Windows Update the one stop for all PC drivers, irrespective of the manufacturer. Talking of upgrades, there are even rumors that Win10 will be offered as a free upgrade to Win8.1 users.

THE COOLNESSES WE WANT TO SEE IN WINDOWS 10



Functional desktop

Win10 will finally implement the much-requested virtual desktops that are already available on Linux window managers and via third-party extensions for Windows. We'd prefer if Microsoft implemented the feature properly and allowed users to create truly customizable and exclusive virtual desktops. The ability to have separate themes, wallpapers, and other artwork, along with the ability to rearrange the furniture on each virtual desktop would be a welcome addition.



Useful Cortana

Windows 10 is all set to lift the Cortana digital assistant from the Windows Phone and bring it into the full-power operating system. Using a voice-controlled digital assistant on the desktop might take some getting used to, but could push usability to a whole new level. Cortana for Win10 should offer similar features as the mobile version, such as the ability to search for content locally and online and set reminders. It'll be interesting to see how it handles the associated complexities.

Simpler upgrades

Microsoft could do us all a great service by implementing a much cleaner update process. Starting with Windows 10, users will be able to upgrade to the next version with the click of a single button. This is obviously a huge improvement. Microsoft is definitely working on reimagining the update process, but the extent of the overhaul remains to be seen. A streamlining of the lengthy reboot cycles that typify Windows updates would be no bad thing.

Consistent settings

Microsoft can save a lot of trouble by better integrating PC Settings and the Control Panel. For the most part, PC Settings is just a cut-down version of the Control Panel. But some settings, such as the lock screen, can only be tweaked by the PC Settings app. To further complicate matters, the Control Panel doesn't list any of these new settings that can be controlled by the PC Settings app, while some settings such as Power and Sleep can be modified in both.

> There's good news if you're a gamer. Win10 will ship with the Direct X 12 graphics API that promises to significantly improve performance.

WINDOWS 10: WHAT MIGHT HAVE BEEN

What can we learn from the radical but failed project that was Windows Longhorn?

BY JEREMY LAIRD

With the next major iteration of Windows motoring towards our PCs in time for summer 2015, there's lots to look forward to. And yet nothing we've learned about Windows 10 thus far has absolutely, positively sets our pants on fire. Put simply, where's the cutting-edge innovation?

The answer, maybe, is that Microsoft's ambition to do something really dramatic with its operating systems, something truly novel, died with the ill-fated Windows Longhorn experiment. Initiated in 2001, it eventually morphed into Windows Vista. What was once the most ambitious operating system update ever from Microsoft became one of its most widely reviled duds in the shape of Vista. For the end user, one of the big news items in Longhorn before the Vista "reset" was a brave new graphical user interface known as Avalon. It was supposed to come complete with full scalability, including vector graphics. The latter are an alternative to fixed bitmaps as used by all Windows operating systems to date for icons, buttons, and other screen furniture.

Recycle Bin
How to Report a Bug
Install Supplement
Longhorn
start
About Windows

Has Microsoft played safe since being so revolutionary with the ill-fated Longhorn?

Even back in the early 2000s, there was an expectation that the coming wave of high DPI displays would hammer up against the wall that was Windows XP's bitmap graphics and hardwired fonts.

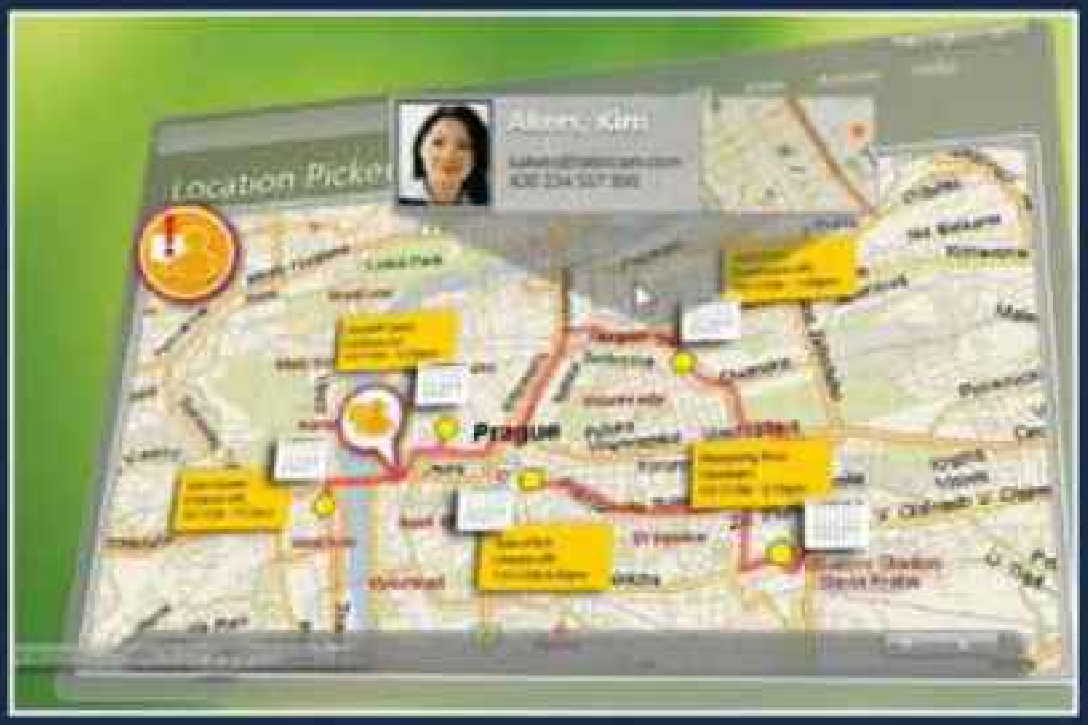
The problem with bitmaps is that they don't scale. Imagine blowing up a 300-by-300 pixel bitmap image across the full width of a high definition display. Yup, it looks a blocky, hideous mess. If you're stuck with bitmaps, the solution is to have lots of different versions of everything to hand—multiple resolutions of a given icon for a range of screen DPIs, for example.

Frankly, that's a kludge. Even if Microsoft does a comprehensive job of its own screen elements in Windows itself (and that certainly hasn't been the case), that approach will still routinely break down if app developers don't do their bit(map)s.

Long-gone WinFS

The solution is vector graphics. Instead of a fixed bitmap of pixels, vector graphics use geometrical primitives such as points, lines, curves, and shapes or polygons. The upshot is that sharpness or detail is maintained as you scale up or zoom into a graphical element. In other words, you can change the size of anything and it always looks fantastic. Vector graphics are the proverbial "right way" to do support for high DPI displays. But the idea eventually got brained in the transition from Longhorn to Vista.

The other major casualty from Longhorn was WinFS, or Windows Future Storage, a radical new file system whose origins date back as far as 1990. Pinning down



We're still waiting for something as radical as Longhorn's Windows File System.

WinFS would have totally changed how we store and interact with our files.

exactly what WinFS was is actually pretty tricky. The basic idea was to integrate some relational database technologies with the Windows File System. It was also part of a broader plan to blur and eventually remove the barriers between local storage on your discs and drives on the one hand, and distributed storage up in the cloud on the other. Indeed, during a Reddit AMA in 2003, none other than Microsoft patriarch Bill Gates chose WinFS and its client/cloud storage fusion as the product or feature that he most regretted had not made it into a final Microsoft product. It was ahead of its time, Gates reckons, and we're still waiting for something like it today.

As for what WinFS would actually do in the real world and why we reckon it's worth revisiting, well, it would dramatically change pretty much everything about how we manage and interact with our files and data. For starters, files stop simply being stored in a series of folders. Instead they become part of a relational database.

Eh, what? Imagine all your files having a range of tags or metadata. Next, picture not storing your files in a specific folder. Instead, they're in the database identified by various tags. A basic tag, for instance, would simply be for all image files. Instantly, WinFS could generate a virtual folder for all of your images. You could then get more specific, creating virtual folders by date or location. Apps could also hook into it. Your calendar app could allow you to see any images taken on a given day at the click of a button.

Or maybe you're working on a project that has multiple different file types associated with it—spreadsheets, text documents, emails, presentations. With WinFS, all of those files would be linked at database level, making it much easier to keep track of everything and also enabling applications to do clever things with relevant data and files.

Dreaming of innovation

Take that idea to the next level by adding in cloud data from, say, social networking platforms, and the possibilities become pretty mind blowing. And yet, as far as we know, this project is essentially dead.

As for why all the goodness was ripped out of Longhorn, Microsoft arguably tried for too many radical features in a single operating system release. In 2002, Bill Gates likened the overall engineering effort going into Longhorn to "the equivalent of many Moon shots." It was too much, too soon.

At the same time, we can't help but be impressed by the scale of Microsoft's ambition for Longhorn. Since then, Microsoft has been increasingly obsessed by the perceived threat from mobile devices and platforms. That explains how over a decade later, we've all been through a difficult learning curve involving an iteration of Windows that lost touch with its core user demographic—desktops—and even now seems more focused on going back to basics than really driving dramatic innovation forward. That is the hard-learned lesson from Longhorn.

> What was once Microsoft's most ambitious operating system update ever became one of its most widely reviled duds in the shape of Vista.

THE MAXIMUM PC VERDICT

First up, forgive us a little repetition. It's important to emphasize again that Windows 10 Technical Preview is not final software. Not in terms of features, not in terms of look and feel, not in terms of performance. In fact, this particular build is very much focused on a single subset of Windows users with some upcoming "consumery" features conspicuously and intentionally absent.

What we just can't do then, is dish up an overall verdict. But what we can say is that Microsoft finally and fully gets what went wrong with Windows 8. Not that Win8 was anywhere near the total train wreck some say. But it did lose touch with its core desktop audience. The interface tweaks in the TP make it obvious Microsoft has remembered what's important for desktop diehards and that's good news. But if Windows 10 wants to go down in history as one of the software giant's greats, it needs to do much more than just fix a desktop experience that shouldn't have been busted in the first place. We want some innovation.

There are tantalizing hints of that in features like the touch-to-desktop Continuum and the inclusion of the Cortana personal digital assistant. For now, we like what we see. But Windows 10 still has plenty to prove. Watch this space. **–MPC STAFF**

Don't be shy with feedback. You might just see your dreams become reality.

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OCULUS RIFT COMPATIBLE
DRM FREE
REPUBLIC OF GAMERS
PQ713

PQ700
CPU_FAN
CPU_OPT
LGA1150
DIMM_A1
DIMM_A2
DIMM_B1
DIMM_B2
CPU_LED
DRAM

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THE GLOBAL AUTHORITY
ON PC GAMES

Mechanical Marvels

Five finger clickin' good keyboards

By Alex Castle

In a lot of ways, your keyboard is the most personal part of your PC. Your CPU and graphics card provide the horsepower, but it's with your keyboard that you get up-close and hands-on each time you use your computer.

It's your keyboard that lets you put all that power to good use—whether that means split-second commands in games or hammering out 100wpm in Word. That's why it doesn't make any sense to skimp when you're pairing a board with your rig.

These days, if you're picking out a high-end keyboard, you've got to go mechanical. Mechanical boards are more responsive, more comfortable, and generally just more fun to use. And they come in a wide variety of configurations for every sort of typist.

In this article, we're going to take a look at five of the best mechanical keyboards on the market today. They're all excellent, but keyboards aren't a one-size-fits-all affair. We'll explain each board's unique strengths and weaknesses, so you can pick the one that's right for you. But first, here's a little more about what to look for...

FINDING YOUR MASTER KEYS

KNOW YOUR CHERRIES FROM YOUR TOPRES

When it comes to mechanical keyboards, the most important consideration is one of the most basic—what switches does it use? A lot of jargon gets thrown around, so it's vital to understand the differences.

The basics: What makes a keyboard mechanical? If the whole movement has caught you off guard, you might be wondering what makes them so special (and expensive). Nearly all keyboards sold in the last 15 years use dome switches—a simple way to register keystrokes that involves a small rubber dome placed under each key. When you push down on the dome, a circuit gets completed. All the domes are stamped out of a single rubber sheet, which makes the whole thing cheap and fairly reliable. Unfortunately, they just don't feel good. They feel like they're made out of rubber. Because they are.

Different (key)strokes

But mechanical keys have a spring under every single key. While different, they're often compared to the classic IBM Model M keyboard, which was satisfyingly tactile and incredibly loud. Yet even among mechanical switches, not all boards are created equal. Most gaming keyboards use Cherry MX switches, but those come in several varieties, with very different feels. Here are the most common.

Blue: The "Clicky" Cherry switch has a distinct tactile bump as you push it down, and makes a lot of noise. It has a great feel while typing, but the actuation force (how hard you have to press down) is higher, making it feel less responsive.

Red: It has no tactile bump at all—just a smooth action all the way down. Actuation force is low for an incredibly responsive feel, but the smooth mechanism feels a little less comfortable for extended typing.

Brown: It represents a nice midpoint. If you can't figure out whether you want to prioritize typing or gaming, the Brown offers a compromise.

Some boards eschew Cherry MX switches, but they aren't common. Some use the Topre switches described on page 52, while recent Razer boards use custom "Razer" switches, though word on the street is those are made by Kailh, a Chinese firm that makes switches that are essentially Cherry replicas. Razer's Green and Orange switches feel very much like the Blue and Brown Cherry switches, respectively.

www.maxkeyboard
MAX KEYBOARD

These nifty keyboard samplers from maxkeyboard.com let you test out what switch works best for you.

Rosewill
RK SERIES
KEYCAP
Capuchons série RK
Get creative with your keyboard
Double shot injection key caps
For professional gamers
For Cherry MX switches

KEYBOARD CUSTOMIZATION

Even after you've chosen, bought, and unboxed a mechanical keyboard, you've still got plenty of options for further customizing your typing experience. There's a booming market for aftermarket keyboard parts, and it's easy to make your board a one-of-a-kind.

The low-hanging fruit in any mechanical board is the keycaps. At www.wasdkeyboards.com you can buy a huge assortment of custom keycaps that can be swapped into almost any mechanical keyboard. You can custom-design a set of colored keycaps with a variety of key styles, including blank keys. You can also buy individual keycaps, or even upload a small image and have it printed on a key. Check out http://bit.ly/MPC_NEkeycaps to see the full sets of replacement keycaps that Newegg sells under its Rosewill brand.

One tip: If you're going to be replacing any keycaps, buy a wire keycap remover. This handy little tool is only $6 at WASDKeyboards, and makes removing Cherry MX keys incredibly easy. If you try and pry them out without a tool, you're liable to scratch nearby keys and damage the keycap or mechanical switch itself.

If you want to go even further down the keyboard-customization rabbit hole, there's a whole online community dedicated to the art of modifying mechanical keyboards. The Mechanical Keyboard subreddit is a good place to start (http://bit.ly/MPC_SRkeymods), with a list of hundreds of guides and tutorials to all sorts of keyboard customization and hardware hacking projects.

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RAZER BLACKWIDOW CHROMA

Razer's best board gets even better

The BlackWidow Chroma's lighting can be customized for each game you play.

THE BLACKWIDOW CHROMA is the latest in Razer's line of high-end keyboards. Like the previous edition, it forgoes Cherry MX switches for custom Razer ones, available in Green or Orange. The marketing plays up these custom switches as a plus, but they don't actually feel different to the Cherry Blues and Browns they're clearly based on.

The Razer aesthetic can be polarizing, with its Lazer Tag color scheme and overly dramatic curves, but it's hard to fault its build quality. It has a gently sloping baseplate that's both dense and minimalistic. The matte-plastic finish on the keys and bezels looks good, and seems reasonably fingerprint-resistant. As a whole, the board is on the larger end, but not excessively so.

The layout is standard with a keypad, plus a single row of five macro keys down the left, which can be assigned in software or recorded on the fly. It features 10-key rollover (meaning it can register at least 10 simultaneous keypresses), which is a bit lower than some of the competition, but still perfectly adequate. The Chroma connects to your PC with a mass of cables that includes two required USB connections, as well as optional mic and audio connectors for the included passthroughs. A single USB passthrough is also included, which helps offset the board's extra USB.

COLOR COMBOS

What sets the Chroma apart is the customizable, per-key LED backlighting. This is a new feature on the market, though as you can see in this roundup, not an exclusive one. Per-key means the backlighting on each key can light up all by itself, unlike previous backlit boards where all the keys had to turn on or off together. The Chroma is the first to combine it with RGB lighting. In other words, not only can each key light up independently, they can also be different colors.

This allows for some impressive visual effects. You can select from a couple of default programs, or customize your own. The defaults are pretty standard (static glow, spectrum cycle, "breathing," etc.) but a few stand out. The "reactive" program turns keys on for a second or two after they're pressed, leaving a ghostly trail as you type, while the "Wave" program causes a constantly cycling rainbow pattern.

You can create a design that fits your favorite game, or just matches your own aesthetics. The software to do this is simple but time consuming. Thankfully, it comes with suggested setups for most game genres. Our big complaint is that your only option for custom lighting is always-on static. We would have liked the ability to define our own custom patterns with the same moving lights and responsive reactions.

Even with limited customization options, the Chroma is a full-featured, well-designed board, and sure to impress. We'd recommend it to any gamer looking to buy into the highest strata of gaming peripheral.

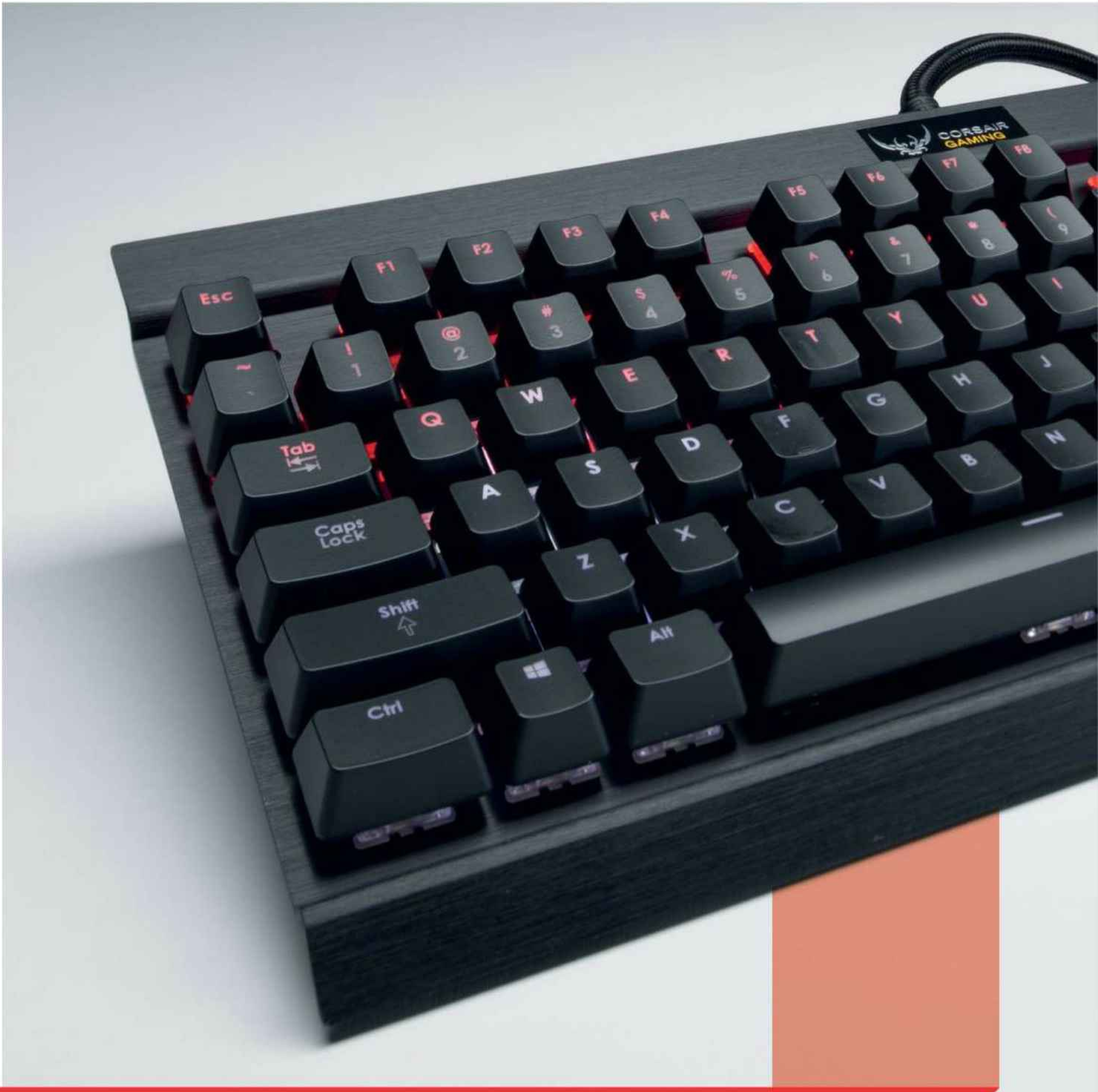
VERDICT
9

Razer BlackWidow Chroma

+ **RAINBOW WARRIOR** Each key can light up independently and in different colors; some great default lighting programs.

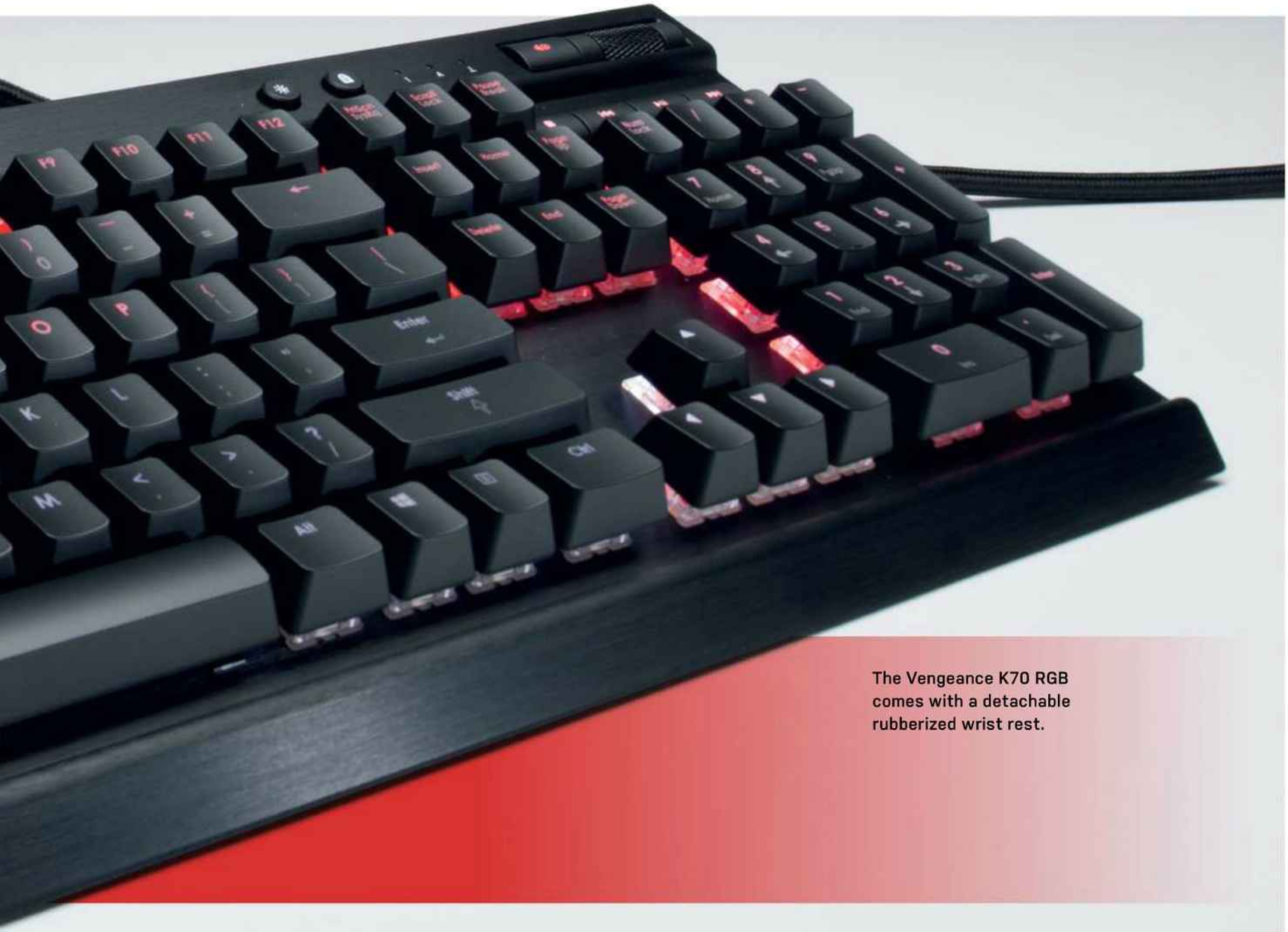
− **GRAYSCALE GRANNY** Customization options could be better; software can be time-consuming.

$170, www.razerzone.com



CORSAIR VENGEANCE K70 RGB

Extra customizable, with drawbacks



The Vengeance K70 RGB comes with a detachable rubberized wrist rest.

LIKE RAZER, Corsair's new top-of-the-line gaming boards are incremental upgrades on a proven design. That design is the K70, one of our favorites of recent years. Although we've reviewed it before, we'll take another look at what we like about it here, before moving on to the new features.

The K70 feels great, sticking with the same design we love. Unlike most boards, which locate the keys in a recessed area, these boards have the switches flush with the flat surface of the board, so the keycaps seem to float. It's a cool look, and it makes it easier to keep the board clean.

The base is protected by an anodized brushed-aluminum panel, which looks great and feels extra-durable. It's not especially compact, but there's little wasted space, and it doesn't hog much desk real estate, unless you attach the included wristrest, which adds three inches of depth.

In addition to the full keyboard with number pad, the K70 has a couple of extra buttons, including a brightness adjustment button, a Windows key lock, and a media control panel with volume wheel. The volume wheels have always been a favorite feature of ours—media keys can be useful, but the ability to quickly adjust volume comes in handy almost every day.

There are no dedicated macro keys, but the software has the ability to assign those macros to any regular key or combination. The keys are gaming-focused Cherry MX Reds—smooth and responsive.

CUSTOM CHAOS

The K70 connects with a braided cable that takes up two USB slots—an inconvenience shared by many high-end boards, but is normally offset with USB pass-throughs. There are no pass-throughs here, so it puts more of a burden on your USB supply.

The marquee feature is the colored backlighting. And it delivers. The lighting is much more customizable than on the BlackWidow—you can set up custom, dynamic lighting patterns for any set of keys. You could, for example, make the number pad flash red and blue, while the function keys display a gradient, and a rainbow wave plays across the "h," "j," and "k" keys.

Unfortunately, there's a flip side. It's the software. The interface for defining color patterns for the K70 is among the least intuitive we've ever used—we had to consult nine Corsair tutorial videos before getting our custom patterns to play. The program is hopelessly clunky.

Looking at reviews online, there are also a lot of people reporting issues with unresponsive keys or LEDs, which Corsair says has been fixed with a firmware update. For what it's worth, we had no issues.

In the end, the K70 is still a great board, but the addition of colored per-key lighting introduces new problems that are worth considering. But if you're looking for the ultimate in customization, the K70 is the board to have—you just need some patience.

VERDICT
8

Corsair Vengeance K70 RGB

➕ **MOD MASTER** Cool design; extra-durable; very handy volume wheels; options for colored backlighting customization are great.

➖ **PLOD MASTER** No USB pass-throughs; software is a nightmare.

www.corsair.com; $170

With the NovaTouch TKL, good things come in plain packages.

COOLER MASTER NOVATOUCH TKL

A great board, but not for everyone

THE COOLER MASTER NOVATOUCH TKL is the most specialized premium board we've encountered yet. For a tippy-top-of-the-line $200, it offers precisely one major feature, and that feature is invisible. What sets the NovaTouch apart and (theoretically) justifies its hefty pricetag is under the surface—the Topre key switches not found in any other mainstream gaming keyboard.

Most recent mechanical gaming keyboards are built on Cherry MX switches, which provide resistance with a set of interoperating metal springs. This was considered a big upgrade over the cheaper rubber switches that dominated the 90s and 00s and offered an unsatisfying, mushy keypress. The Topre is an interesting hybrid, featuring both a metal spring and a rubber dome. The dome in this case is not a cost-saving measure, but a feature designed to provide a smoother, quieter keypress.

The result is a typing experience unlike anything else on the market. Topre keys require about the same amount of force to actuate as most Cherry MX switches, but once you reach the actuation point, they depress very quickly. The "operating point"—where the switch reports the keypress to the computer—is higher than in the MX switches, so the keys feel very responsive. In terms of feel, the NovaTouch TKL is a more subdued typing experience. The Topres don't make any noise when they pass their actuation point, and only a minimal sound when they bottom out. The actuation itself is smooth, and lacks the distinct tak-tak-tak of most mechanical boards. But whether this is preferable is personal preference, so we'd recommend anyone thinking about buying a Topre board to find a way to try it out first.

KEEPING IT SIMPLE

In our experience, the NovaTouch TKL is an absolute joy. The smooth action is easy on the hands even during long writing sessions, while still feeling much more responsive and reliable than traditional dome-switch boards. Perhaps best of all, the Topre switches are a godsend in a shared office environment, where you have to weigh the tactile benefits of a mechanical keyboard against the noise pollution.

Beyond the actual typing experience, the NovaTouch is markedly austere. It offers no macro keys, no USB or media passthroughs, and no software-support whatsoever. For a $200 keyboard, the NovaTouch's slim feature set is almost brazen. There's no number pad on the board, and the bezels are very thin, so even though the layout is standard, the NovaTouch is remarkably compact, and doesn't take up much space. The USB cable is removable, and the board comes with a velvet pouch, so you can take it on the road, if you like.

The overall build quality is excellent, with a hefty base and durable-feeling keycaps. The Topre switches in the NovaTouch are specially modified to accept keycaps made for Cherry MX switches, so you can tap into the surprisingly robust world of aftermarket mechanical keycaps, if you want to customize your board.

All in all, the NovaTouch TKL is a great board, but for a very specific type of person. That person cares about how their board feels, not about flashy effects or bonus features. They like responsive keys, but prefer a smoother, quieter feel. Also, they should probably have a lot of disposable income. If that sounds like you, we enthusiastically recommend the NovaTouch. If not, you'll find more bang for your buck elsewhere.

VERDICT **8**

Cooler Master NovaTouch TKL

➕ **TOP CAT** Quiet, smooth, and very responsive Topre keys; compact size; good build quality.

➖ **SMELLY CAT** Very limited extra features; expensive compared to competition.

$200, www.coolermaster.com

"The Perfect PC"
- Forbes
Tiki
GODLIKE POWER
MICRO-TOWER
www.falconnorthwest.com

COOLER MASTER QUICK FIRE RAPID-I

A compact board for the discerning gamer

The Quick Fire Rapid-i cuts out the number pad to save you space.

IF THE NOVA TOUCH seems too specialized, consider the Rapid-i—the newest member of Cooler Master's fundamentals-first Quick Fire line. It combines neat new features with good build quality and design.

The Quick Fire is "tenkeyless," which means it doesn't have a number pad. This drastically decreases the desk space footprint. It also helps gaming, since you can keep your mousing hand closer to your WASD hand.

Quality-wise, it's excellent, with a very sturdy base, coated in a rubberized finish. Extra-slim margins and a detachable USB cable enhance the compact design, making it easy to use on impromptu desktops, or with a laptop. The keyboard features Cherry MX Blue switches, which are great for typing, but are also Cherry's loudest.

The Rapid-i features per-key white backlighting, with support for basic reactive lighting, where keys light up whenever you press them. It also allows you to adjust the repeat rate (how often a signal is repeated while the key is held down). The board presumably gets its name from this feature, but we suspect few gamers will actually use it.

If flashy, gimmicky features matter less to you than a convenient, comfortable board, you're the perfect audience for the Quick Fire Rapid-i.

VERDICT **9**

Cooler Master Quick Fire Rapid-i

+ FAST & THE FURIOUS Compact but sturdy design; Blue switches good for typing; white backlighting; adjustable repeat rate.

− BIKER BOYZ Blue switches might type well, but are super-loud.

$140, www.coolermaster.com

MAD CATZ STRIKE TE

Mad Catz's first mechanical keyboard is a pleasant surprise

Mad Catz packs in five extra macro buttons around the arrow keys.

THE MAD CATZ GAMING KEYBOARDS have been improving steadily over the years, and the latest STRIKE TE is the first that's really a contender.

Previous premium Mad Catz boards married over-the-top design and superfluous features with cheap-feeling rubber dome switches—not great. But now it's offering a mechanical board with Cherry MX Brown switches. The Browns are a nice hybrid, offering a slightly tactile experience without a ton of noise.

It's the best-feeling board Mad Catz has ever produced. The baseboard is super heavy and overall construction is very tight. The keycaps feel nice and the rubberized finish looks great. The white LED backlighting isn't customizable, but it looks good.

The board's design, however, is still extravagant for our taste and while a small row of seven mini-macro buttons offers lots of customization, they're not easy to hit in the heat of a game. Five additional macro keys are nestled around the arrow keys, but their position also makes them inaccessible when in the standard gaming hand position.

Still, for those seeking a solid, mechanical keyboard with a more traditional gamer aesthetic, the Mad Catz Strike TE is a very viable choice. ⏻

VERDICT **8**

Madcatz STRIKE TE

+ HOME RUN Big improvement on previous Mad Catz efforts; Brown switches are a good compromise.

− NO-HITTER LED backlighting isn't customizable; awkward positioning of some keys; alternative key glyphs moved.

$150; www.madcatz.com

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MAXIMUM PC MINIMUM EFFORT

The lazy guy's **alternative guide** to being a tech guru

BY LUIS VILLAZON

Expert is a relative term. By which we mean it's a term our relatives use. "Ask him, he's the computer expert," our mother-in-law will say, to anyone who'll listen. After decades of fixing other people's problems, we're used to being called experts. But the reality is every family has its expert. To qualify, you just need to be the youngest adult that owns a PC.

Sooner or later, your grandma or your uncle or your sister-in-law will mention their laptop is broken or iTunes keeps crashing, and you'll feel guilted into taking a look. Whether you fix it or not makes no difference. You'll still be the computer expert. After all, you've just spent a frustrating Sunday afternoon downloading drivers or booting in and out of Safe Mode. You must know what you're doing.

But this is no way to live. Nobody wants to be that sort of expert. It's not effective and the hourly rate is terrible. There are people who enjoy pointlessly fiddling with computers, but you aren't one of them and neither are we. What we all want is to spend the minimum time fixing computers, and the maximum time actually using them. It doesn't matter whether you're fixing your own computer, doing a favor for a relative, or even mending computers professionally, the goal is always to find the quickest, simplest fix that works.

That's the difference between an expert and a guru. A guru can listen to a long, rambling list of unrelated symptoms and quickly decide which ones need fixing and which ones don't. A guru knows how to quickly google for an answer he or she can trust. A guru understands when to spend time on a problem and when to spend money. Most importantly, a guru knows *who* to spend time on. Too often, simply recommending to do as you do will only lead to a thousand follow-up questions and as many hours completing everyone else's builds. But a guru doesn't spend all of their spare time swapping motherboards or reinstalling Windows. They spend it playing PC games.

A guru enjoys all of the kudos of being an expert, with none of the hassle. We understand that building a PC from the ground up is what it's all about for many of you, as it is for us. But it's not for everyone. Sometimes, the lesson needs a subtle tweak, it needs to be simplified and justified. Sometimes, you need to be an *alternative* tech guru. We're going to teach you how.

THE ROAD TO ENLIGHTENMENT

Promoting the simpler path to PC perfection

Let's start with your own PC. You need two: a desktop and a notebook. The notebook should be cheap and the desktop should be midrange. Don't combine the two and get an expensive laptop. The desktop is for games. You need a large monitor, a respectable graphics card and CPU, plus good speakers. If you try to do this on a laptop, you'll end up paying far more for the same performance. You also want to be able to upgrade the graphics card once during the life of a games PC, and this is all but impossible with a laptop.

You can get by with a cheap $500 notebook that will do all the workaday tasks, like sofa surfing, email, and spreadsheets. This ringfences the activity most likely to cause problems (gaming), and means that whichever one breaks, you've got another one to use for googling solutions.

Put the desktop PC on the table, not the floor, and face it sideways. If you have it with the front facing you, the rear becomes a tangle of cables that never gets dusted. Some of that dust will get pulled inside and coat your mobo and the poor clearance interferes with ventilation.

Back up both of your PCs once a month. Without fail. These should be complete clones of the entire hard disk using Acronis True Image ($80, www.acronis.com) onto an external USB drive at least as large as your PC's internal drive. Use a different backup drive for each PC. Put your documents in cloud storage, not on the internal hard disks. Those clone drives are just for disaster recovery.

> “Back up both of your PCs once a month. Without fail. These should be complete clones of the entire hard disk. Put your documents in the cloud.

Surprising advice

Don't build your own computer. Ten years ago, the alt tech guru will say, this was a good way to learn how a PC was put together. But PCs are easy to assemble now. All you'll really learn is how building one doesn't save any money. It's also much harder to claim on your warranty when something doesn't work—all of the manufacturers will blame each other. And don't ever reformat and reinstall Windows, the guru will add. This is the last apple at the bottom of the troubleshooting barrel. It takes ages, the PC is never quite the same afterwards, and it doesn't fix the problem. If you're desperate enough to reinstall Windows, you're desperate enough to get a new PC. Which *will* fix the problem.

Don't update your drivers, either. We know this is the first item on just about every troubleshooting flowchart ever, but we've come to the conclusion this is a stalling tactic dreamt up by customer support hotlines. Unless you know of a *specific* bug in your current driver release that you are experiencing and the release notes for the new version explicitly mention that bug has been fixed, all you're doing is adding one more variable. New drivers are just as likely to introduce new bugs as fix old ones, so higher version numbers aren't necessarily better.

With this foundation laid, your PCs will never ever break or crash. But, ahem, when they inevitably do, you'll find all computer problems fall into one of five categories...

HOW TO GOOGLE

Not everything on the Internet is true

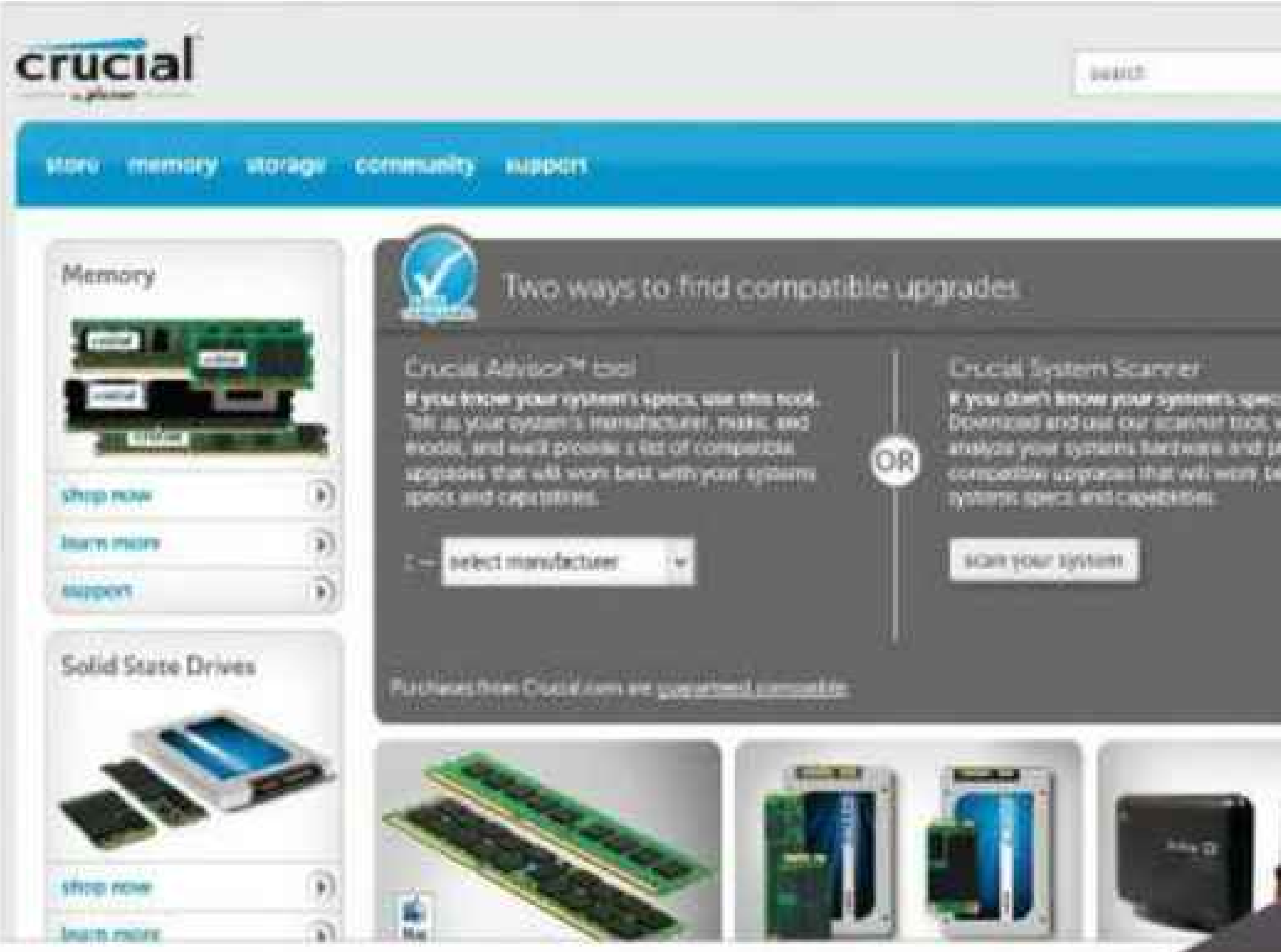
Knowing the right answer isn't an especially useful skill. Being able to find the right answer is much more valuable. Recognizing the right answer is even better. Here are some tips to help your "google-fu."

Google the answer, not the question. "*Watch Dogs* crashes randomly" will give you forum posts from complaining gamers. Instead, try "*Watch Dogs* patch notes" and you can skim the list of bug fixes to see if any address your problem. Ignore YouTube videos. A video is much harder to skim quickly and the comments offer very poor feedback.

Avoid slideshows. "Eight tips for getting *Watch Dogs* running smoothly" is just a way for commercial sites to generate page views. Six of those tips will be generic and the other two won't apply to you.

Follow the crowds. Don't look for a single forum post with a definitive "right" answer. Skim multiple sites and look for patterns. If the same fix is confirmed repeatedly, it's much more likely to be reliable.

Know which sites to trust. Search results from stackexchange.com are highly valuable because they use a rigorous voting system. Game developer forums and also answers.microsoft.com are the next tier down. Sites such as answers.yahoo.com and answers.com are just garbage.



No one ever made their PC worse by adding more RAM.

Clone Disk Wizard
Choose clone mode.

Clone the entire hard disk for the most comprehensive backup.

1. SPONTANEOUS BREAKAGE

"IT WAS WORKING FINE UNTIL I DROPPED IT"

The first category is for computers that abruptly transition from working to not working. This could be the entire computer refusing to boot up at all, or it could be that you can't connect to Steam, or maybe *Watch Dogs* has scrambled textures. It doesn't matter *what* stopped working, the important part is that it stopped suddenly.

Spontaneous Breakage is the easiest problem to diagnose. It occurs because something changed. Either a hardware component failed or you added something that was incompatible with the rest of the machine. Identify the last time you can definitely say the PC was working, and the problem must lie with something that changed since then. Uninstall any new software or restore your PC back to the previous full backup and see if the problem goes away. Then repeat any Windows updates and reinstall programs one by one until it returns, just to be sure.

If you haven't added anything to the PC recently and it broke anyway, you can be sure a hardware component has failed. If the PC won't boot, you can usually tell which component is dead by how far into the boot sequence the PC gets (see "What Should Happen," page 63). If you're not sure, systematically replace the RAM, PSU, graphics card, and hard disk, in that order. This is so that you check the easiest components first, not the most likely.

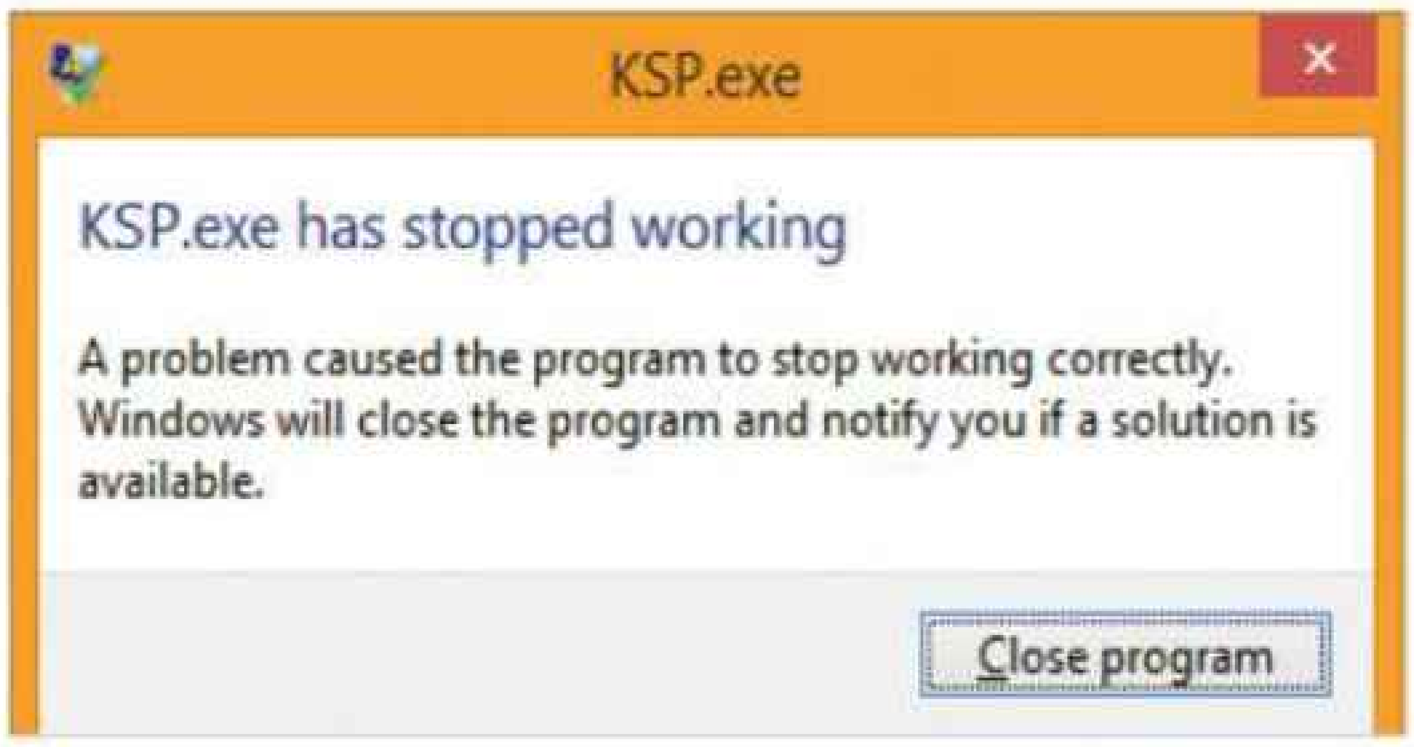
Your assessment of likelihood is probably wrong and you'll save time in the long run if you get into the habit of systematically checking the easy things first. You might think a game with messed-up textures can only be caused by a faulty graphics card, but RAM and PSU faults can both cause this as well, and they are both much cheaper to replace. Inevitably, you'll end up replacing some perfectly good components unnecessarily this way. So you should always buy upgrades, rather than exact replacements. That way, all your wrong guesses are at least upgrading your PC along the way. And you can hang on to the functioning parts you replace, for the next time you need to perform a diagnostic swap. Motherboards and CPUs aren't worth replacing. Ditch your PC off and get a new one.

2. REPRODUCIBLE CALAMITY

"EVERY TIME I TRY, IT JUST CRASHES"

If you can reliably crash an application or generate one of those error messages that end-users were clearly never meant to see, then congratulations! You have found a bug. Finding bugs is a well paid job for some people, so if you enjoyed finding it, you should consider a career in software QA. But you've only found one, so don't get too carried away.

There's generally nothing you can do about a bug except report it and hope it gets fixed in the next version. This is like voting in a general election. It's your duty to do it, but it doesn't actually make any difference. In the meantime, you'll just have to work around the bug. But at least you don't need to waste any more time looking for a solution.



KSP.exe has stopped working

A problem caused the program to stop working correctly. Windows will close the program and notify you if a solution is available.

Abrupt game crashes are usually bugs in the game or its mods.

AVOIDING THE EXPERTS

How to avoid the run around

The guy in the store is not a computer expert. He's just someone with good interpersonal skills who knows his way around the basics. If your mom wants to set up her Gmail account in Windows Live Mail, he can help. If you come to him with your weird blue screen error, you'll be given some misleading jabber and then steered towards a sale.

The lady in the call center is not a computer expert, either. She's working from a troubleshooting flowchart of simple solutions to the most common problems. Her goal is to get rid of you as quickly as possible, so she can keep her call stats up. These are not bad people, they just aren't the droids you're looking for.

The truth is there aren't really any experts anywhere. There are just people who've come across the same problem as you, and people who haven't and are guessing loudly. To be a tech guru you need to start filtering out this noise. The only reason for visiting a computer store is to see if you like the keyboard action on a specific laptop. The only reason for ringing a customer support line is for billing enquiries and refunds. Or for problems with your broadband connection. Everything else you will fix for yourself, armed only with the mighty Internet.

Online is actually the only place you are likely to come across honest answers. In the real world the people who know them are tucked away doing well-paid jobs far away from grubby customers. But online you can get their help for free. Don't waste time asking directly though; just skim the forums for similar questions and triangulate the suggestions from the most well-informed replies. If your problem is common enough, someone else will have already asked. If it isn't, then you won't find the answer online. Either way, you're in and out quickly.

3. CREEPING BADNESS

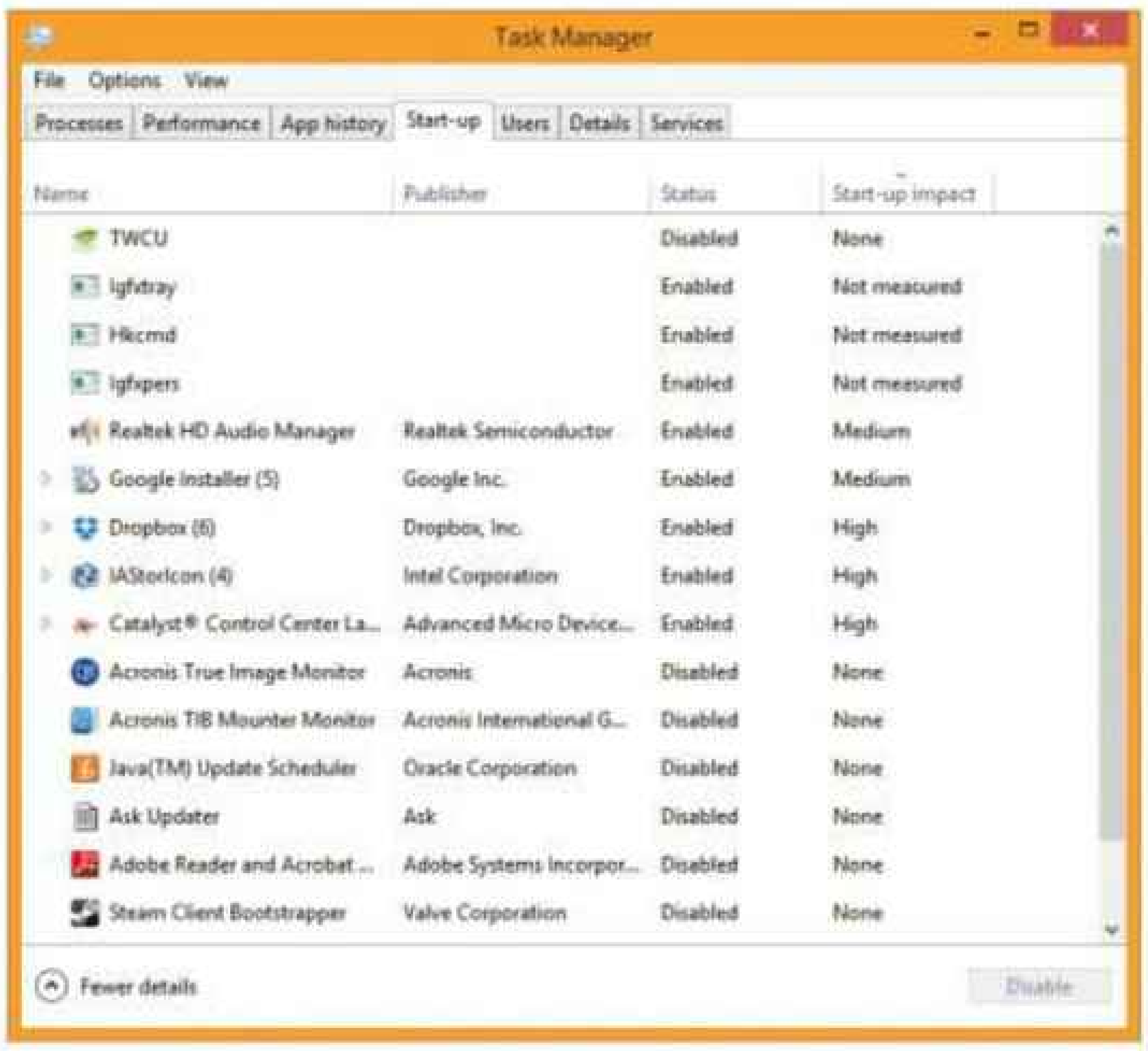
"IT'S JUST GETTING WORSE AND WORSE"

Badness nearly always means your PC is getting slower. And normally, the solution is just to put up with it. We *know* that's not what the Internet tells you. But like youthful skin and powerful erections, the solutions offered on the Internet to speed up your PC are all scams. There is no "weird trick" that Microsoft doesn't want you to know.

Microsoft is extremely invested in making your PC run as well as possible. If removing old entries from the Registry made a big difference, Windows would already do it. You can make your PC a little faster by upgrading your RAM, removing programs from the startup group (especially your antivirus software), and uninstalling programs you don't need. But most of the slowdown comes from the updates bloat building up over time. If you want a noticeably faster PC, buy a new one.

The other thing people complain about is heat output, especially from a notebook. Older notebooks run hotter because they're trying to run newer games on older hardware. They've also collected dust on the motherboard and on the fan blades.

You can't do anything about the former, except upgrade, and we'd argue you shouldn't do anything about the latter, either. We've never dismantled a notebook and felt things were better after. Try not to use it on the bed, where the comforter blocks the vents, and hope the graphics card doesn't blow before it's time to upgrade. Remember, heat is just a sign you'll need a new notebook soon. And new notebooks are a good thing.



Task Manager
File Options View
Processes | Performance | App history | Start-up | Users | Details | Services

Name	Publisher	Status	Start-up impact
TWCU		Disabled	None
Igfxtray		Enabled	Not measured
Hkcmd		Enabled	Not measured
Igfxpers		Enabled	Not measured
Realtek HD Audio Manager	Realtek Semiconductor	Enabled	Medium
Google Installer (5)	Google Inc.	Enabled	Medium
Dropbox (6)	Dropbox, Inc.	Enabled	High
IAStorIcon (4)	Intel Corporation	Enabled	High
Catalyst® Control Center La...	Advanced Micro Device...	Enabled	High
Acronis True Image Monitor	Acronis	Disabled	None
Acronis TIB Mounter Monitor	Acronis International G...	Disabled	None
Java(TM) Update Scheduler	Oracle Corporation	Disabled	None
Ask Updater	Ask	Disabled	None
Adobe Reader and Acrobat ...	Adobe Systems Incorpor...	Disabled	None
Steam Client Bootstrapper	Valve Corporation	Disabled	None

Removing startup junk is one of the few go-faster tips that works.

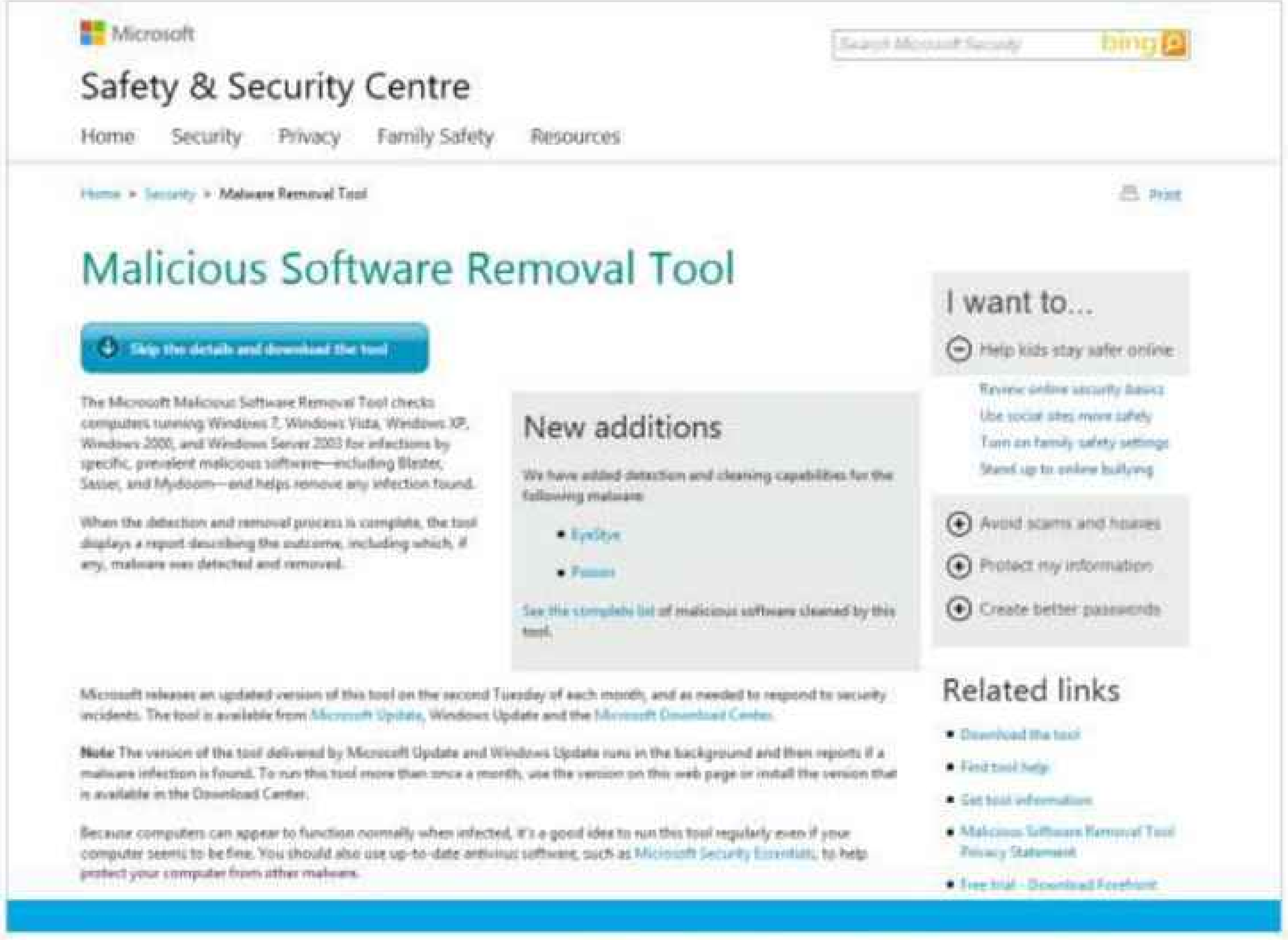
4. RANDOM WEIRDNESS

"SOMETIMES IT JUST FREAKS OUT FOR NO REASON AT ALL"

There are three kinds of random fault: loose connections, overheating, and memory errors. If it freaks when you pick it up, it's a loose connection. If it freaks when you've been watching movies or playing games for a while, it's overheating. Everything else is a memory glitch. You can fix memory glitches by replacing your RAM. The other two kinds usually can't be fixed, so just replace the RAM anyway, in case you were wrong.

Random weirdness that happens rarely isn't worth doing anything about. If our PC reboots itself spontaneously once a week, we'll take a few calming breaths not waste several days hunting a fault that's extremely hard to reproduce. But if it reboots five times a day, then this is frequent enough not to count as random at all. You can treat this sort of fault as Spontaneous Breakage.

If your notebook runs hot while gaming, that's totally normal.



Microsoft

Safety & Security Centre

Home Security Privacy Family Safety Resources

Home > Security > Malware Removal Tool

Malicious Software Removal Tool

The Microsoft Malicious Software Removal Tool checks computers running Windows 7, Windows Vista, Windows XP, Windows 2000, and Windows Server 2003 for infections by specific, prevalent malicious software—including Blaster, Sasser, and Mydoom—and helps remove any infection found.

When the detection and removal process is complete, the tool displays a report describing the outcome, including which, if any, malware was detected and removed.

New additions

We have added detection and cleaning capabilities for the following malware:

See the complete list of malicious software cleaned by this tool.

Microsoft releases an updated version of this tool on the second Tuesday of each month, and as needed to respond to security incidents. The tool is available from Microsoft Update, Windows Update and the Microsoft Download Center.

Note: The version of the tool delivered by Microsoft Update and Windows Update runs in the background and then reports if a malware infection is found. To run this tool more than once a month, use the version on this web page or install the version that is available in the Download Center.

Because computers can appear to function normally when infected, it's a good idea to run this tool regularly even if your computer seems to be fine. You should also use up-to-date antivirus software, such as Microsoft Security Essentials, to help protect your computer from other malware.

I want to...

Help kids stay safer online

Review online security basics

Use social sites more safely

Turn on family safety settings

Stand up to online bullying

Avoid scams and hoaxes

Protect my information

Create better passwords

Related links

- Download the tool
- Find tool help
- Get tool information
- Malicious Software Removal Tool Privacy Statement
- Free trial - Download Forefront

Malware that redirects your browser homepage is rarely serious...

... But if you suspect anything worse, use Microsoft's removal tool.

5. OMINOUS PORTENTS

"I'M SURE I'M INFECTED"

When people come asking for computer advice, gurus listen to the symptoms, not the diagnosis. Some people are convinced their PC is constantly under attack and see every unexplained behavior or error message as evidence of a virus infection or a hacker. If you're one of those people, stop it! Provided Windows is updating automatically and you've changed the admin password on your broadband router from the factory default, avoiding viruses and hacking is mostly a question of not being an idiot when you click links.

If your browser homepage has changed by itself, or you can't open google.com, then you've probably got a browser hijack. This is malware, but it isn't a virus, and it isn't ebola. Download the Microsoft malicious software removal tool from http://bit.ly/19RSCsO and follow the instructions there. Don't bother with commercial products that have free trials. Their business model relies on scaring you into buying the full version, so they tend to over-report any potential problems.

BONUS CATEGORY

6. RAINBOW CHASING

"I JUST WANT TO TRY THE LATEST THING"

Don't try and level your PC up, like a character in an MMO.

A PC is like a character in an MMO. When you start at level one, you fight wolves. You gradually upgrade so you can take on several wolves at once. But there will always be new gear you could get, and chromium ultra-wolf den mothers you could be fighting. Rainbow chasing is when you try to fix problems that don't exist. Overclocking just to get a bigger number in your benchmarking tool, say. Or configuring a RAID0 array of disks, when hard disk performance isn't even a bottle neck.

Yes, upgrading is generally good, but there are two pitfalls. Don't upgrade for the sake of it. You should upgrade to run new software that exists now, not what might exist soon. You can't tell how long it will be before something comes along, and by then, your upgrade might not go far enough up. Secondly, you need to know when to upgrade the components and when to upgrade the PC.

Here's what the alt tech guru recommends. Every other version of Windows, buy a new desktop or laptop with that version preinstalled. On the other releases, upgrade on the existing machine. When we buy a PC, we'll go one notch above the midrange for CPU and graphics card, and get the maximum RAM that Windows currently supports. We normally get the default hard disk size. After a year, if we want to run an app that needs more RAM or a faster graphics card, we'll upgrade. If it needs a faster CPU, we'll get a new PC. We've never run out of disk space.

A common question is, "which new graphics card/notebook/motherboard do you recommend?" The guru answer is always to go with whatever Amazon suggests. Filter to only show items with four star reviews and pick whatever is selling for the right price. For a graphics card it's $350. For a laptop it's $500 for a basic machine and $1,250 for a fancy one. For a motherboard it's $150, although we would never replace the motherboard separately. The only reason for upgrading the mobo is to upgrade the processor as well and, if you're doing that, you may as well buy a whole new computer. You'll get a better PC, with less hassle.

LEARN TO PROGRAM

It's like bench pressing for your brain

Programming is an extremely helpful skill for a tech guru. Lots of command-line operations become easier, but much more importantly, it teaches you what a computer really is. Programmers are like Neo. They don't see icons, they see resource handles. Memory isn't just a quantity, it's a collection of discrete integers. When you understand how the house is built, you'll know which walls you can smash and which will bring the ceiling down.

Programming means debugging, and the mindset you need to track down a tricky bug is exactly the same as the one you need to diagnose every other computer problem. It's like classical music theory. You can teach yourself a few chords without it, but you won't become a great musician.

As soon as you can write a simple program, more complicated programs lose their mystique. And if you can write even a modestly useful app or a mod for a game, then your computer itself will be demystified to a degree that is impossible to overstate. So, yes, we're advocating a little effort up front. But it will make being lazy later much easier.

Python is a good language to start with—it's a widely used, serious language, but it's designed to be readable and simple. You can learn the basics for free in a few weekends at http://bit.ly/1bmXyG5 and learnpythonthehardway.org. Don't be put off by the "hard way" part; if you can complete a sudoku, you can definitely learn Python.

124.0
123.9
149.0
148.9
OFF
ON
MANUAL

WHAT SHOULD HAPPEN

Understanding the boot sequence to recognize anomalies

The power button signals the motherboard to tell the power supply (PSU) to fire up properly, and also pulls the voltage to 0V on the reset pin for the CPU.

This puts the CPU into a known start state with default values loaded into all the registers and sets the instruction pointer to the start address of the BIOS. Between 0.1 and 0.5 seconds later, the voltages have stabilized. It signals this by putting +5V on the Power Good line. This tells the mobo to release the reset line.

The CPU now begins executing the Power On Self Test (POST) in the BIOS or UEFI code. This initializes the RAM and the PCI bus. If there's a problem, you'll receive a series of beeps. A single beep indicates a pass and control passes to the video card, which executes its own video BIOS initialization routine.

Once the video subsystem is working, control comes back to the BIOS or UEFI and you'll either see the summary screen with the version number and installed RAM, or just a pretty splash screen. While this is displayed, each drive is checked in turn until it finds a bootable one. Control passes to the boot loader program stored on this disk, which copies the Windows kernel and basic drivers into RAM.

After that, the Windows logo appears, the boot loader copies the registry into RAM, and loads the remaining drivers. Once that is complete, the boot loader hands off to the Windows kernel and the login screen appears.

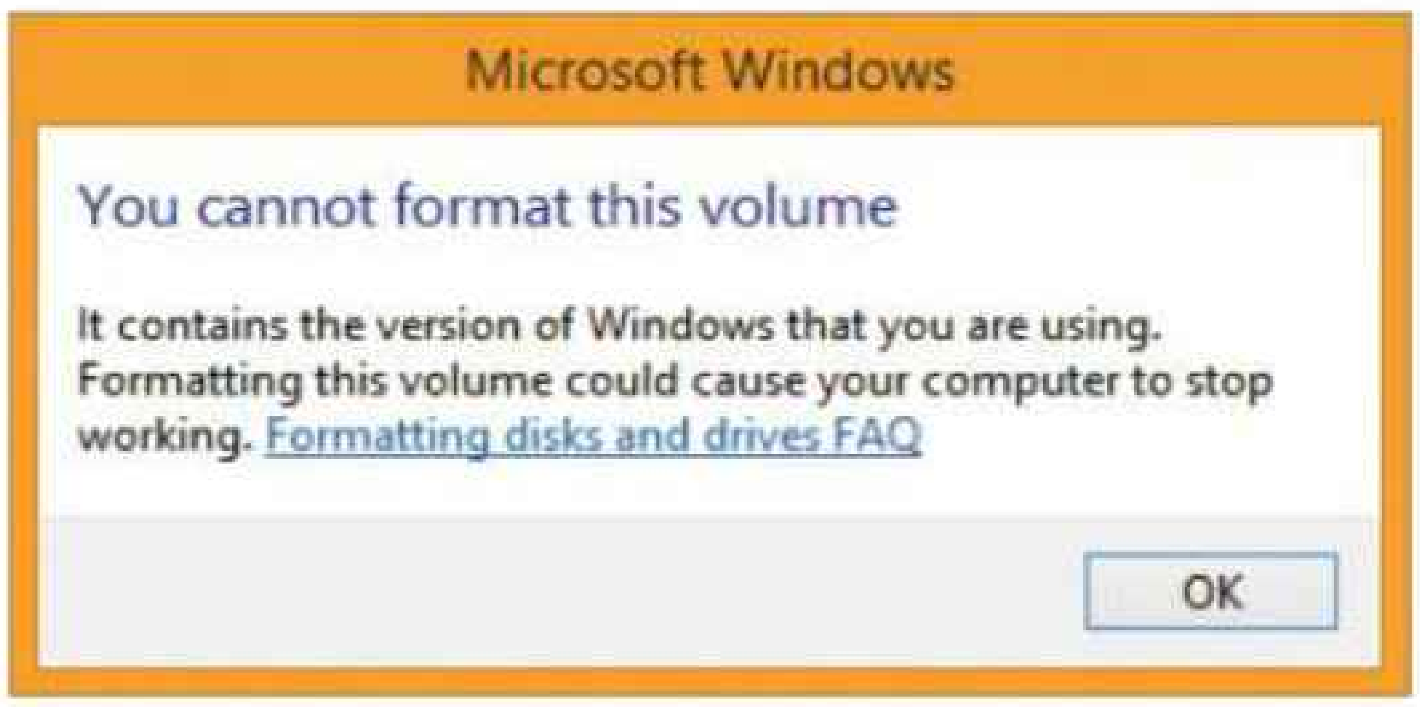
HELPING OTHERS

OR NOT, MIGHT BE THE BEST PATH TO ENJOYING YOUR GURU STATUS

As a tech guru, you have to do more than diagnose the problem. You must also consider who is asking for your help and choose the best solution. By that we mean the best solution for *you*. For family members, you need the quickest resolution, because they will come back to haunt you if you don't fix it on the first try. Swapping RAM modules around is a quick and safe thing to try, but reformatting and reinstalling Windows will be like cutting the head off a hydra. You may fix the original problem but three more will grow in its place as you try to restore all the drivers for their 15-year-old printers and off-brand sound cards.

With friends and neighbors you are less invested, so wherever possible, recommend new kit. Our experience is that this is generally what they're hoping you will do; your wisdom will be used as bargaining leverage with their spouses or parents to justify a big spend. If you try and save them money, they'll secretly resent you, and the next time their ancient PC breaks, you'll be blamed.

If you're fixing computers for customers, your priority is to safeguard their data. Before you so much as open Device Manager, clone their entire hard disk onto a removable drive of your own. This will feel like a ridiculous precaution every single time, until you actually need it, whereupon it will feel like the best advice anyone has ever given you. Remember: if data is lost *for any reason* while you're sat in front of the keyboard, you *will* be blamed. Cloned hard disks are like save points: you can afford to be more adventurous, if you know you can hit F9 and reload.



You cannot format this volume

It contains the version of Windows that you are using. Formatting this volume could cause your computer to stop working. Formatting disks and drives FAQ

Reformatting the boot volume is neither straightforward nor necessary.

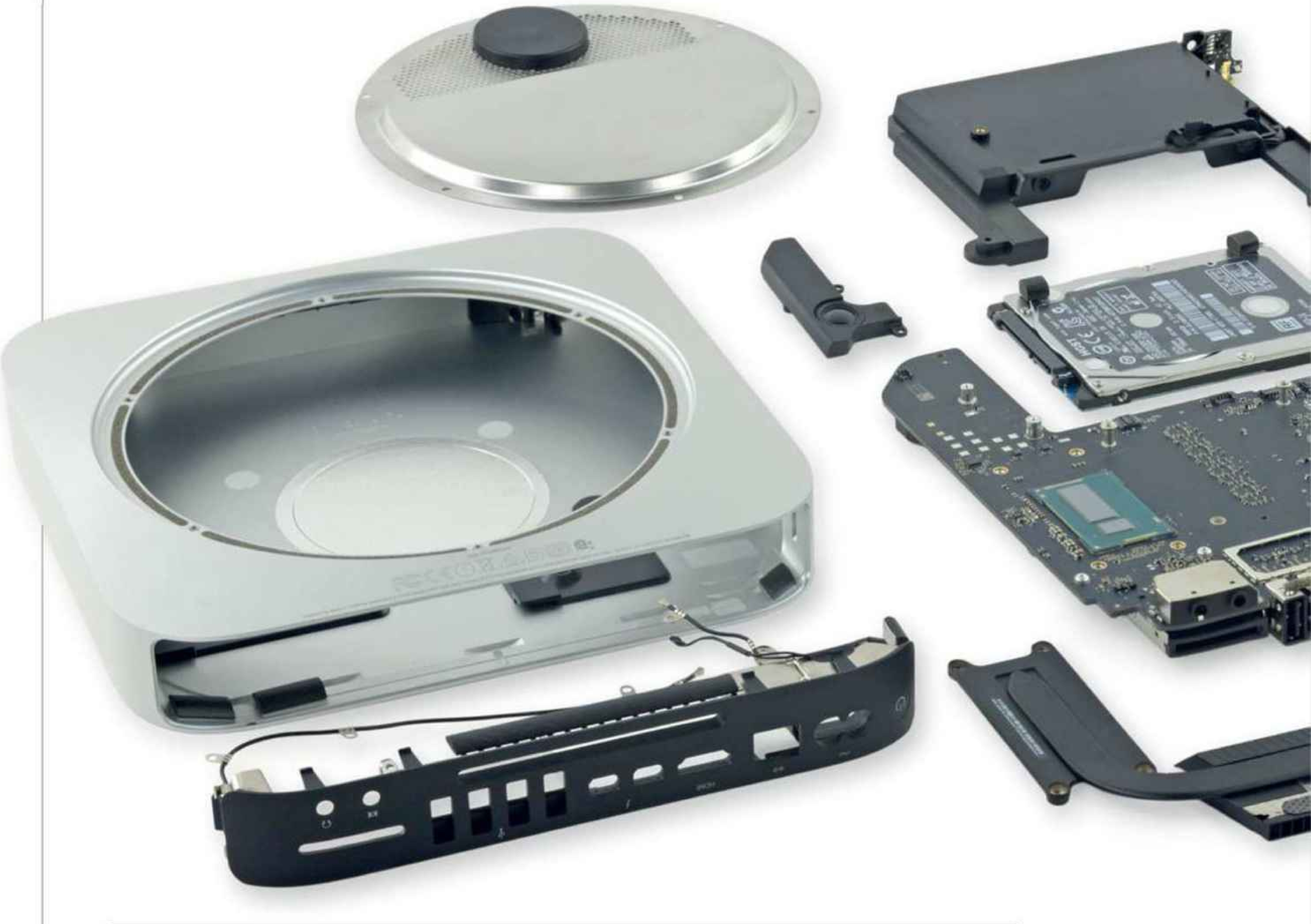
Is that all? Are you really an alternative tech guru now? Of course you are! Gurus don't have all the answers, they just know how to remain calm under fire while they look for one. They know where to look and they know the answer when they see it. You can do all these things. All you need now is the self-confidence. If anyone tries to call you an expert, by all means deny it. But if they call you a guru, just smile.

IFIXIT presents:

AUTOPSY

THIS MONTH WE DISSECT...

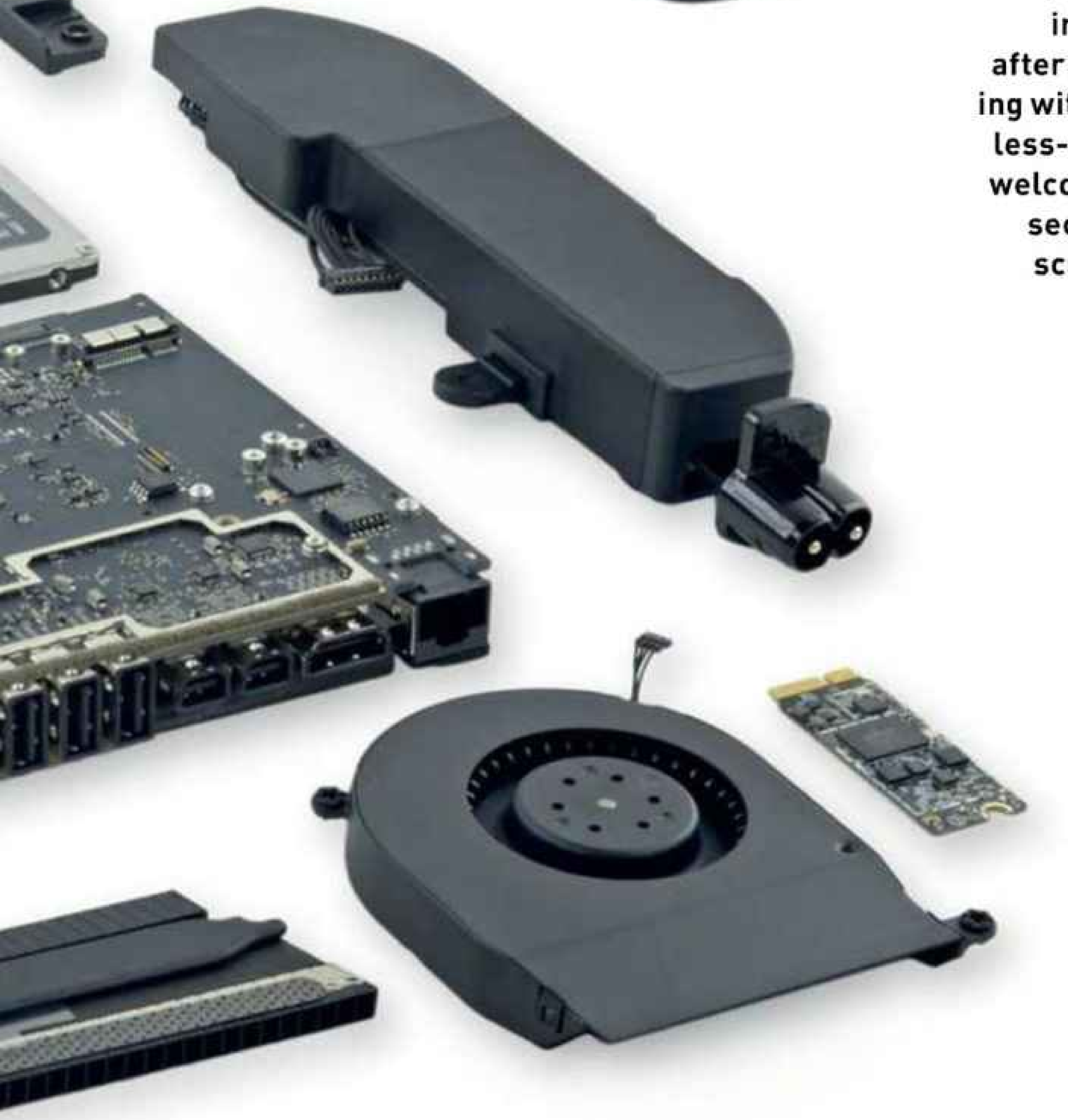
Apple Mac Mini



614-0515 China
C0443920YBVF5WRAR
R33030

The Mac Mini power supply hasn't changed since 2011.

Finally inside, after dealing with the less-than-welcoming security screws.



BACKGROUND:

What? Two Apple products back-to-back? Yup. But after last month's had-to-do-it iPhone 6, there's more method to our madness this time. After all, the Mac Mini is just a tiny PC that happens to ship with a proprietary non-Windows OS. And say what you want about Apple, but it does have an annoying habit of engineering its hardware seriously well. What we have, then, is an interesting look at something akin to a money-no-object engineering job on a small form factor PC. Dig in!

MAJOR TECH SPECS:

- 1.4GHz dual-core Intel Core i5 (turbo boost up to 2.7GHz) with 3MB L3 cache
- 4GB of 1600MHz LPDDR3 memory
- 500GB hard drive
- Intel HD Graphics 5000
- 802.11ac Wi-Fi and Bluetooth 4.0

KEY FINDINGS:

- The backside is almost identical to the previous iteration. The only change is the omission of a FireWire port in favor of an extra Thunderbolt 2 port. Gone are the handy thumb indents and indicators. The twist-off bottom cover is also a goner, replaced by a pop-off cover that reveals a new metal door where there was once handy access to the RAM and fan.
- The door is secured with three TR6 Torx Security screws. Really? Rude. They're the smallest we've ever seen.
- Finally inside, we pop out the fan and its fancy Advanced Hydraulic Bearing. The AirPort card is dispatched next, after removing a screw and disconnecting two antennas.
- Using our hand-powered Mac Mini logic board removal tool, we remove the board. Past Minis have had two SATA ports, allowing for an extra hard drive. This year we only get one.
- On one side we find 4GB of Samsung LPDDR3 DRAM. But it's soldered to the logic board. If you want to upgrade the RAM, you must do so at time of purchase. Then there's the Cirrus Logic 4208-CRZ Audio Codec, the Intel DSL5520 Thunderbolt 2 Controller, and the Broadcom Ethernet PCIe Controller with SD3.0 Card Reader and ASF 2.0. We also discover the Intel Core i5-4260U processor with Intel HD Graphics 5000 (again, soldered), along with the Macronix BIOS chip.
- All that's left is the neatly packaged 85W power supply (unchanged since 2011) and the hard drive caddy with its conventional 2.5-inch magnetic drive.
- Repairability Score: 6 out of 10 (10 is easiest to repair). That's down two from the previous Mini. Sure, with the proper tools, disassembly is straightforward. But TR6 Torx Security screws are intended to lock you out and make it hard to clean the fan or replace the hard drive. Plus the CPU and RAM are soldered to the logic board and not user-upgradeable.

About iFixit

iFixit is a global community of tinkerers dedicated to helping people fix things through free online repair manuals and teardowns. iFixit believes that everyone has the right to maintain and repair their own products. To learn more, visit www.ifixit.com.

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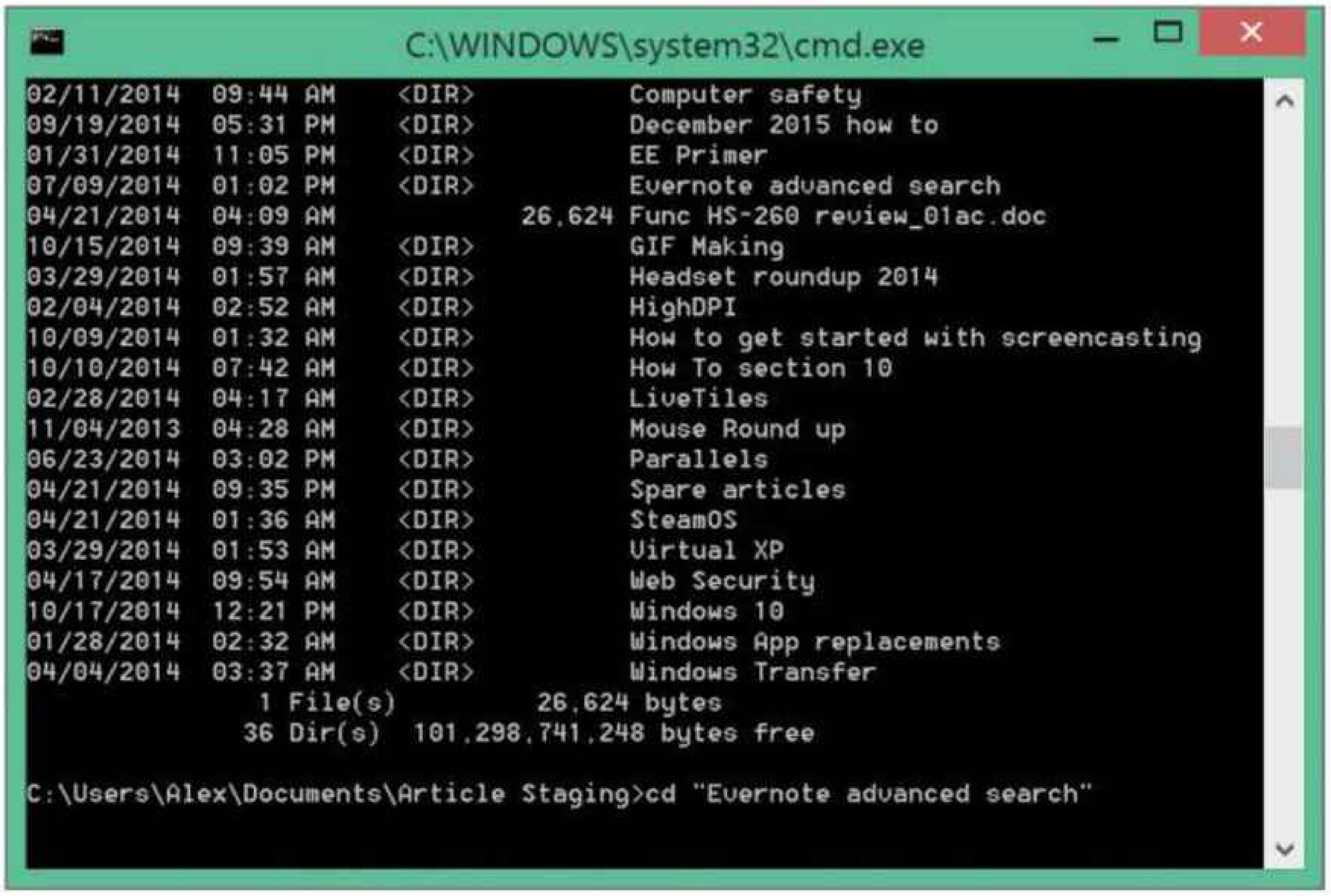
HOW TO

STEP-BY-STEP GUIDES TO IMPROVING YOUR PC

WINDOWS TIP OF THE MONTH



C:\WINDOWS\system32\cmd.exe

```
02/11/2014  09:44 AM    <DIR>          Computer safety
09/19/2014  05:31 PM    <DIR>          December 2015 how to
01/31/2014  11:05 PM    <DIR>          EE Primer
07/09/2014  01:02 PM    <DIR>          Evernote advanced search
04/21/2014  04:09 AM            26,624 Func HS-260 review_01ac.doc
10/15/2014  09:39 AM    <DIR>          GIF Making
03/29/2014  01:57 AM    <DIR>          Headset roundup 2014
02/04/2014  02:52 AM    <DIR>          HighDPI
10/09/2014  01:32 AM    <DIR>          How to get started with screencasting
10/10/2014  07:42 AM    <DIR>          How To section 10
02/28/2014  04:17 AM    <DIR>          LiveTiles
11/04/2013  04:28 AM    <DIR>          Mouse Round up
06/23/2014  03:02 PM    <DIR>          Parallels
04/21/2014  09:35 PM    <DIR>          Spare articles
04/21/2014  01:36 AM    <DIR>          SteamOS
03/29/2014  01:53 AM    <DIR>          Virtual XP
04/17/2014  09:54 AM    <DIR>          Web Security
10/17/2014  12:21 PM    <DIR>          Windows 10
01/28/2014  02:32 AM    <DIR>          Windows App replacements
04/04/2014  03:37 AM    <DIR>          Windows Transfer
               1 File(s)         26,624 bytes
              36 Dir(s)  101,298,741,248 bytes free

C:\Users\Alex\Documents\Article Staging>cd "Evernote advanced search"
```

NAVIGATE EASIER WITH COMMAND PROMPT COMPLETION

One of the most inconvenient things about the Windows command prompt is having to type in long file names. To make your navigation easier, take advantage of Tab autocompletion. At any time, just hit the Tab key and the command prompt will attempt to complete the filename you're currently typing. Press Tab again to cycle through possible completions.

MAKE – USE – CREATE

ZOTAC
FIRESTORM

68
Overclock your GPU

71
Secure your wireless network

ALEX CASTLE
CONTRIBUTING EDITOR

TAKING ADVANTAGE OF TASK VIEW

Windows is finally getting a feature that's been available on rival platforms for years—multiple desktops. Called "Task View," the new Windows feature lets you switch between arrangements of windows without having to manually minimize and maximize them one by one. It's a great way to make your workflow more efficient, but if you're not sure how to put it to good use, let me suggest my go-to arrangements.

Have one desktop for your active task, keeping just a single window open, whether it's Word, Excel, or Photoshop. No other windows means no distractions.

The next is for work necessities, such as email, Evernote, and other "necessary evils." These are programs I can't live without, but that can represent an obstacle to getting my primary task done. Finally, distractions. I keep my web browser open on a third desktop.

By separating these three types of programs, and not opening them simultaneously on the same desktop, it's much more clear whether I'm keeping on-task or not.

↘ submit your How To project idea to: comments@maximumpc.com

Overclock Your GPU

YOU'LL NEED THIS

DEDICATED GPU
OCing integrated graphics isn't recommended. Use a dedicated GPU from AMD or Nvidia.

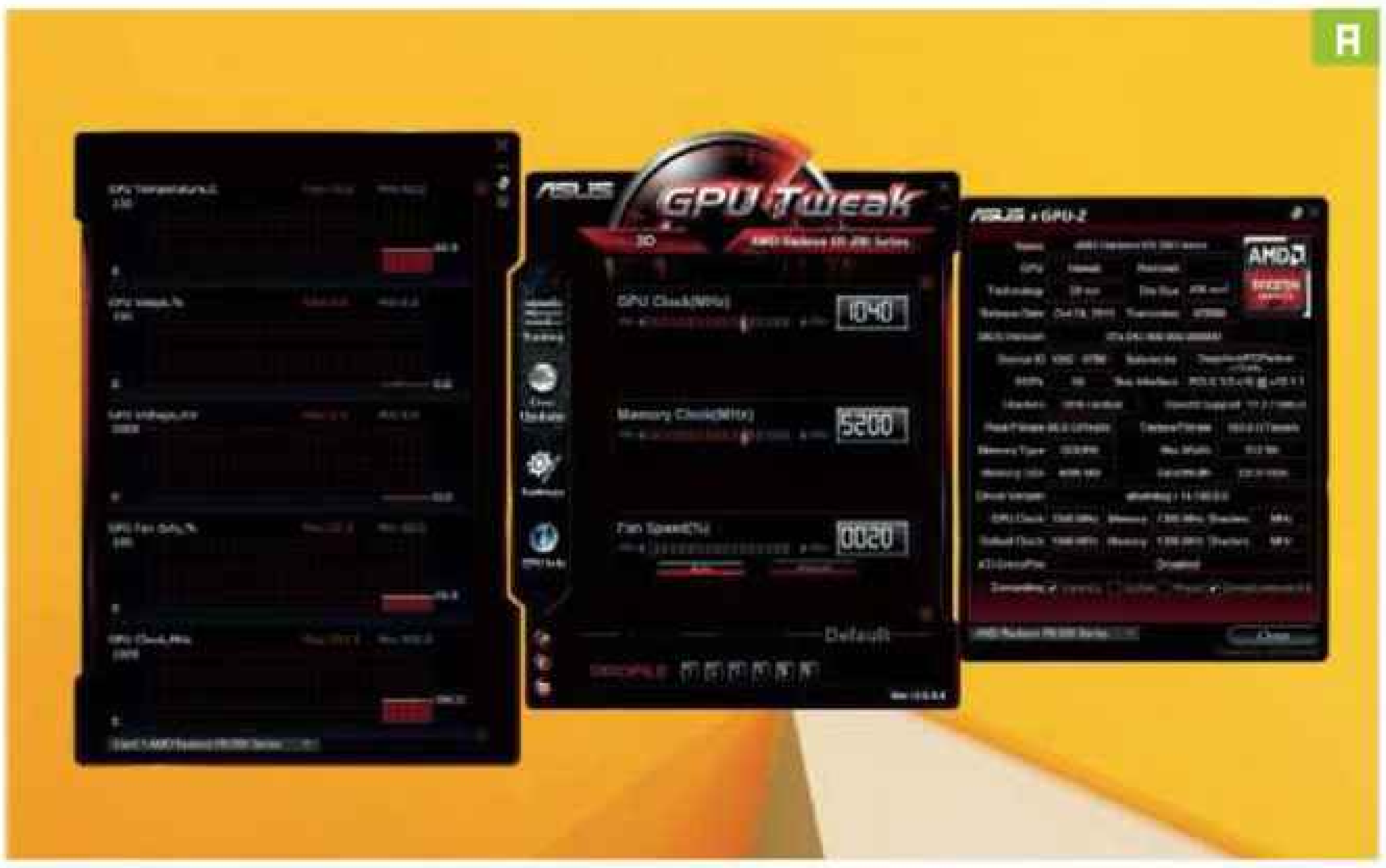
SOFTWARE
OCing software comes with GPUs, or can be downloaded.

THERE COMES A TIME when however powerful your graphics card is, the latest games will stutter with all the visual settings cranked up to "Ultra." But that doesn't necessarily mean you need to buy a new GPU. By overclocking your graphics card you can make it work harder, without spending any cash. Of course, as with overclocking processors, there are caveats. We don't want to scare you off—for the most part, overclocking is safe and easy—but you should know the risks. You'll be pushing your card to its limits, and there's a slight chance things could go wrong. You should also check your GPU's warranty, because overclocking might invalidate it. Also keep your expectations in check. You should see improvements straight away, but if there's a game your graphics card is really struggling with, an overclock won't suddenly make it playable. If that's the case, you may still have to look at upgrading your GPU. –**MATT HENSON**

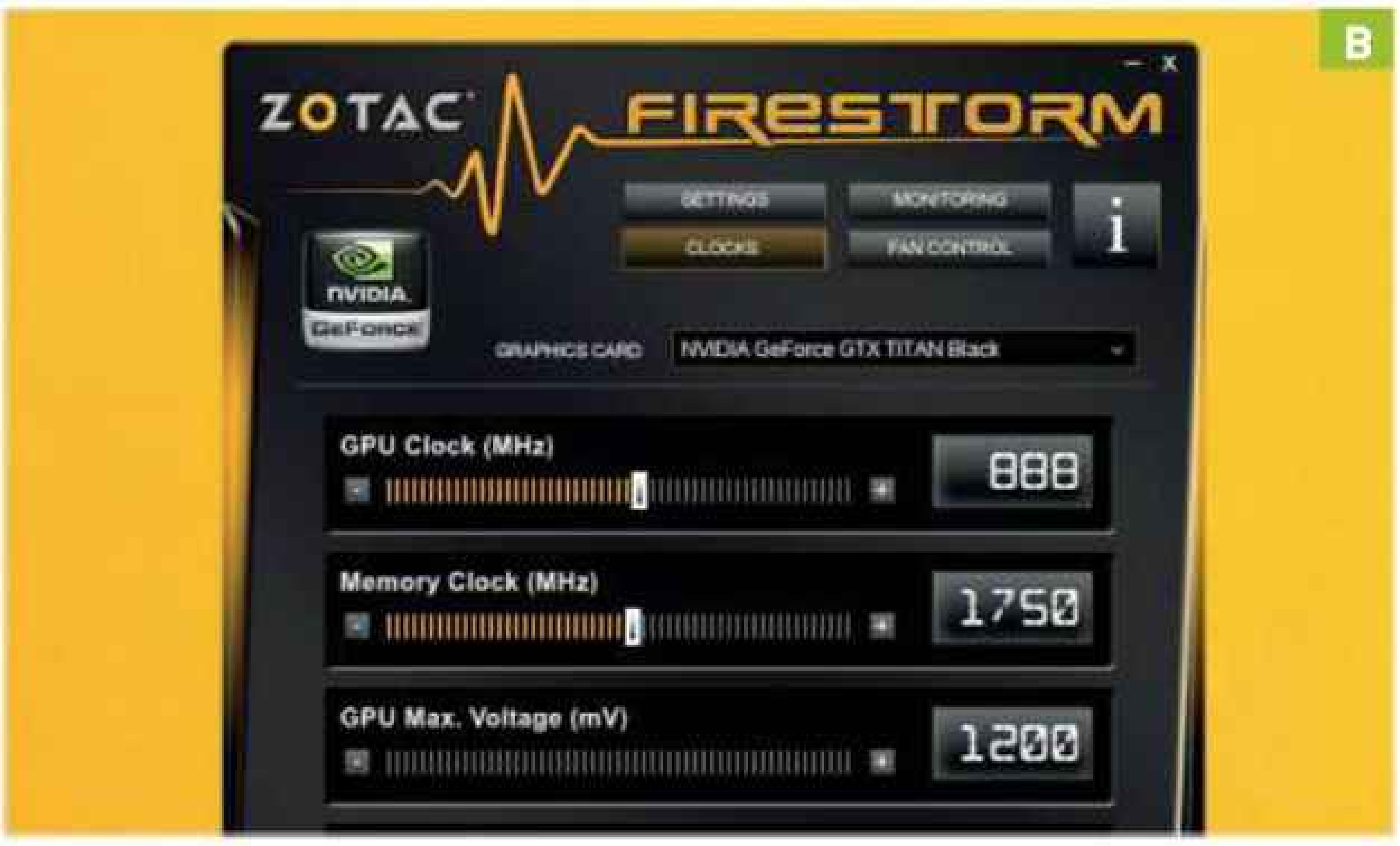
1 DO YOUR RESEARCH

A little reading at the start will save you time later, plus make sure your overclock is built on a sturdy foundation, so look up your graphics card. Type your card's model, make, and manufacturer into a search engine to see how other overclockers have fared (websites such as www.overclock.net have active forums). But only use their results as a rough guide. Don't assume you can just apply the same settings—your GPU might not be exactly the same, even if it seems so on paper. Applying a big leap in clock speeds is not advisable either, because putting in the wrong values could damage your hardware.

Nvidia's GeForce GTX 780 Ti is currently one of the best dedicated GPUs that money can buy.



GPU Clock(MHz) 1040
Memory Clock(MHz) 5200
Fan Speed(%) 0020



GRAPHICS CARD NVIDIA GeForce GTX TITAN Black
GPU Clock (MHz) 888
Memory Clock (MHz) 1750
GPU Max. Voltage (mV) 1200

2 GET TOOLED UP

Overclocking can be time-consuming, but there's a number of things that make the task easier than overclocking a processor. To begin with, the procedure is done using tools within Windows, rather than the BIOS, so you don't have to keep rebooting your machine. The various tools we're using to overclock the system are also more user-friendly.

» First, visit your card manufacturer's website (for Nvidia, see www.nvidia.com and click on "Drivers," for AMD, visit http://support.amd.com). Check your drivers are up to date.

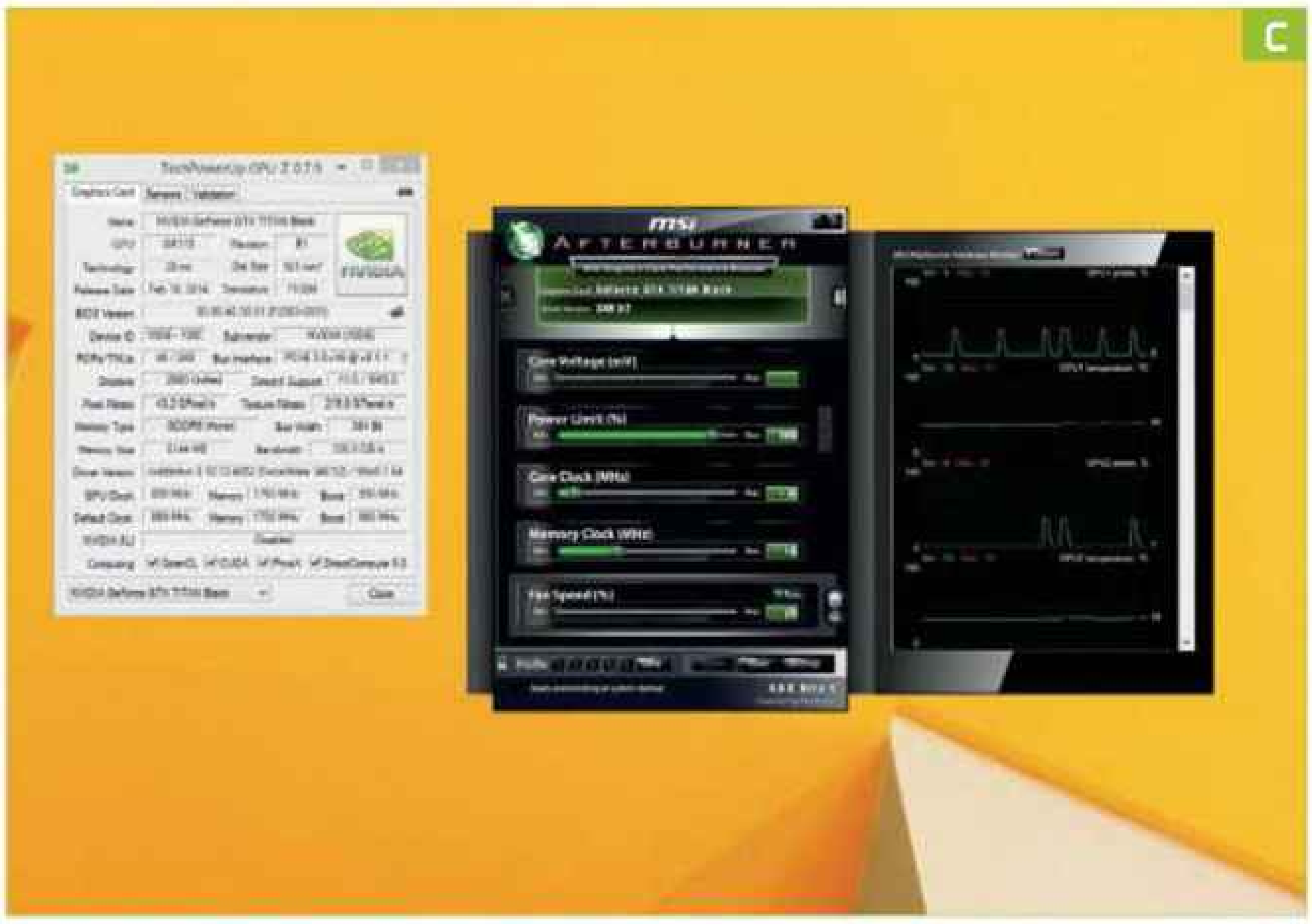
» Next, visit http://unigine.com/products/heaven to download Heaven Benchmark. This is what you'll use to check your overclock is stable. Run Heaven and save the results before you start overclocking, so that a comparison can be made later.

» Finally, download and install the overclocking and testing tools for seeing the benefits of the overclock and making sure it can perform under pressure. Here are three good options—the interfaces are largely similar, so it's mainly a personal choice.

» Asus GPU Tweak (**Image A**) comes with Asus GPUs or can be downloaded from http://bit.ly/PCFasustweak. When you run Tweak, you'll see a window with several sliders to apply to your overclock. On the right-hand side you'll see GPU-Z Incorporated, a handy tool for getting information about your card.

» Zotac Firestorm comes with Zotac GPUs or can be downloaded from www.zotac.com/z-zone/zotac-firestorm.html. It has a more understated design and you get a single window with a number of tabs. Clicking "Clocks" takes you to the overclocking section, which uses sliders to increase values (**Image B**). Click "Monitoring" for temperature, fan speeds, and more.

» Perhaps most popular is MSI Afterburner, which comes with MSI cards or at http://event.msi.com/vga/afterburner. This is the one we're using, but you can apply the same settings in the other overclocking tools if you have those instead.


C

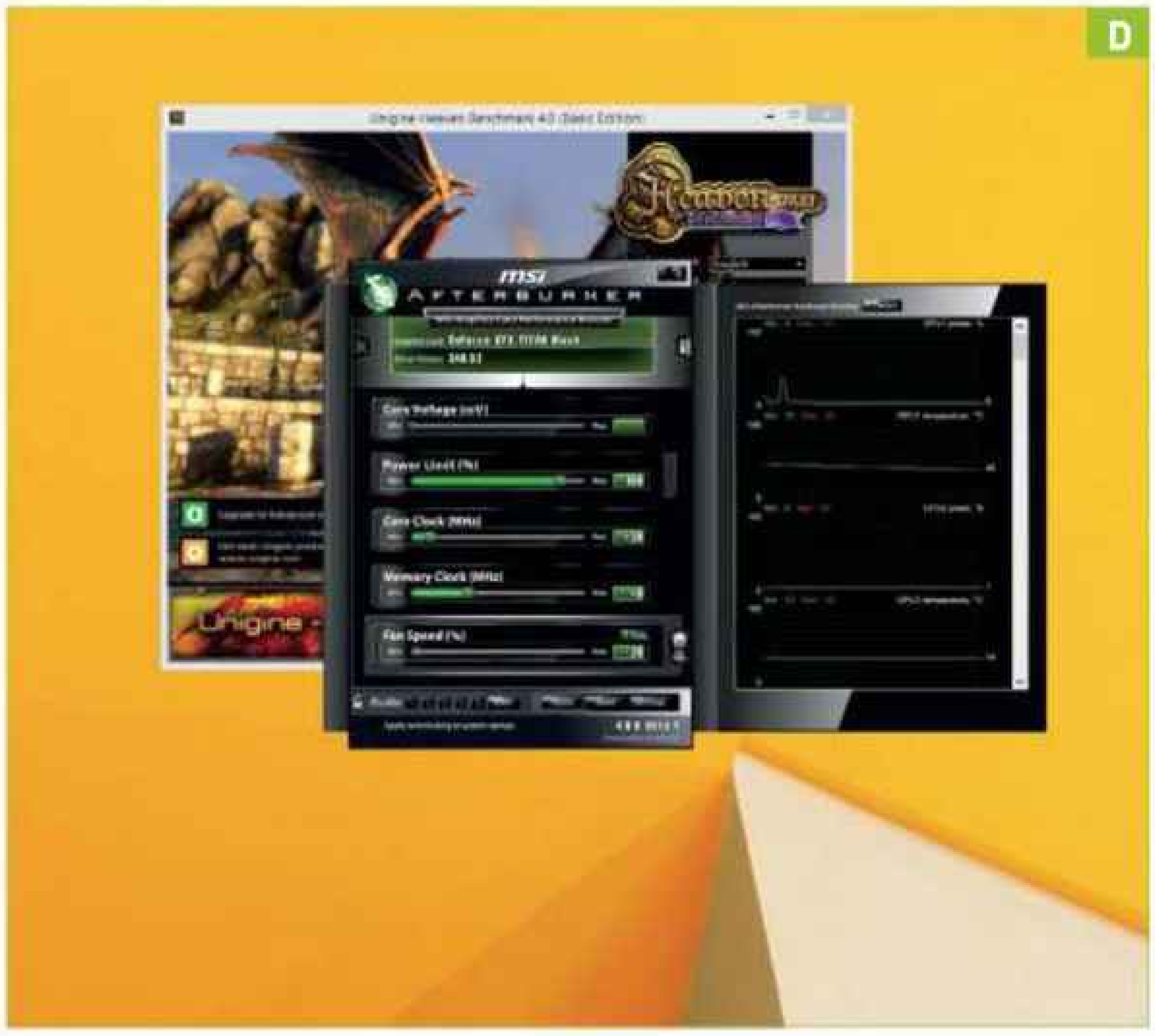
3 START THE OVERCLOCK

Begin by running Afterburner. On the first screen you'll see an overview of your card, and sliders that can be used to overclock it (**Image C**). On the right you'll see graphs that show the temperature and power levels of your card. Keep a close eye on these to make sure they remain safe.

» The best way to overclock is to increase by small increments, then test the stability. Go to the Core Clock (MHz) slider and up it by 10MHz. Once done, click "Apply." See if the overclock is successful by using GPU-Z (downloaded from www.techpowerup.com/gpuz) and checking the Clock entry.

» To ensure your overclock is stable, run the Heaven Benchmark (**Image D**). This puts your card through several intensive tests. At the main welcome screen, set Tessellation to "Extreme" and Antialiasing to "x8," then click "Run." Press [F9] to actually start the benchmark. If it completes without any problems, your overclock is stable and you can repeat the process.

» Return to Afterburner and raise the core clock speed by another 10MHz, then check GPU-Z. If all's well, run Heaven Benchmark. If it's OK, repeat until you see an error, then return to the last stable value. A slightly riskier alternative, when your card falters, is to up the voltage. Simply click "Settings" in Afterburner and tick "Unlock voltage control" (**Image E**). Move the slider up 10mV and run the benchmark. If it's stable, increase again. Make sure the temperature hits no more than 90°C.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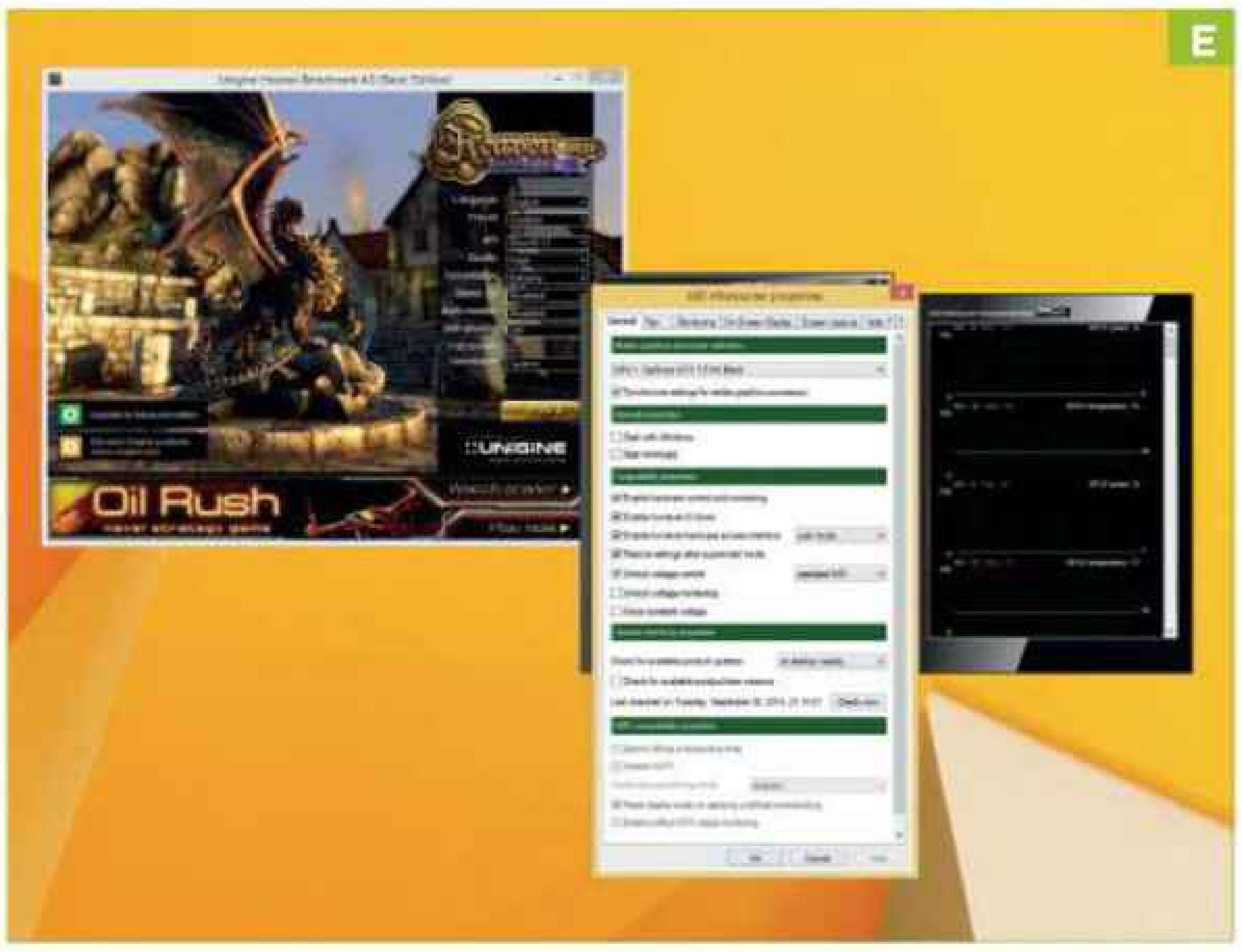
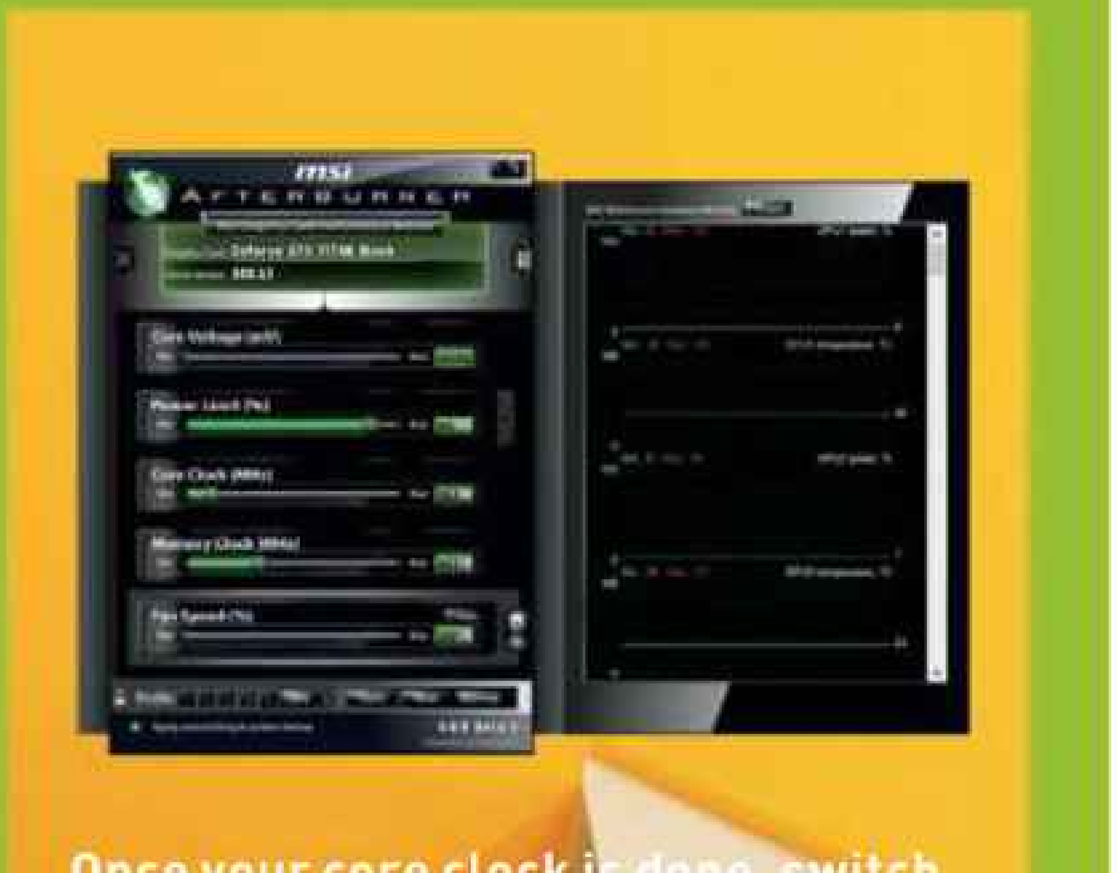

E

INCREASE THE MEMORY CLOCK

Once you've figured out how high you can push your GPU's core clock, you can do the same with the memory clock to eke out some more performance. The good news is that if you've gone through the process of overclocking the core clock, you know the drill.

Move the slider to increase the value by 10MHz and then click "Apply." Now, run Heaven Benchmark again and make sure no errors occur. Don't worry if the benchmark stutters—its aim is to really put your GPU through its paces, so it's doing its job. If the benchmark completes OK, return to Afterburner and increase the memory clock value by 10MHz again. Keep doing this until the overclock is unstable. When it is, dial the memory clock back to the last stable value. You'll now have your maximum overclock, and you can begin really stress testing your machine to make sure this overclock is stable.

If your PC behaves erratically, don't worry. Simply click the "Reset" button on Afterburner to return all the values to normal. The overclock is only applied when you run Afterburner, so you can start it up before playing games. If you want it to run automatically, place a tick next to "Apply overclocking at system startup."


Once your core clock is done, switch your attention to the memory clock.

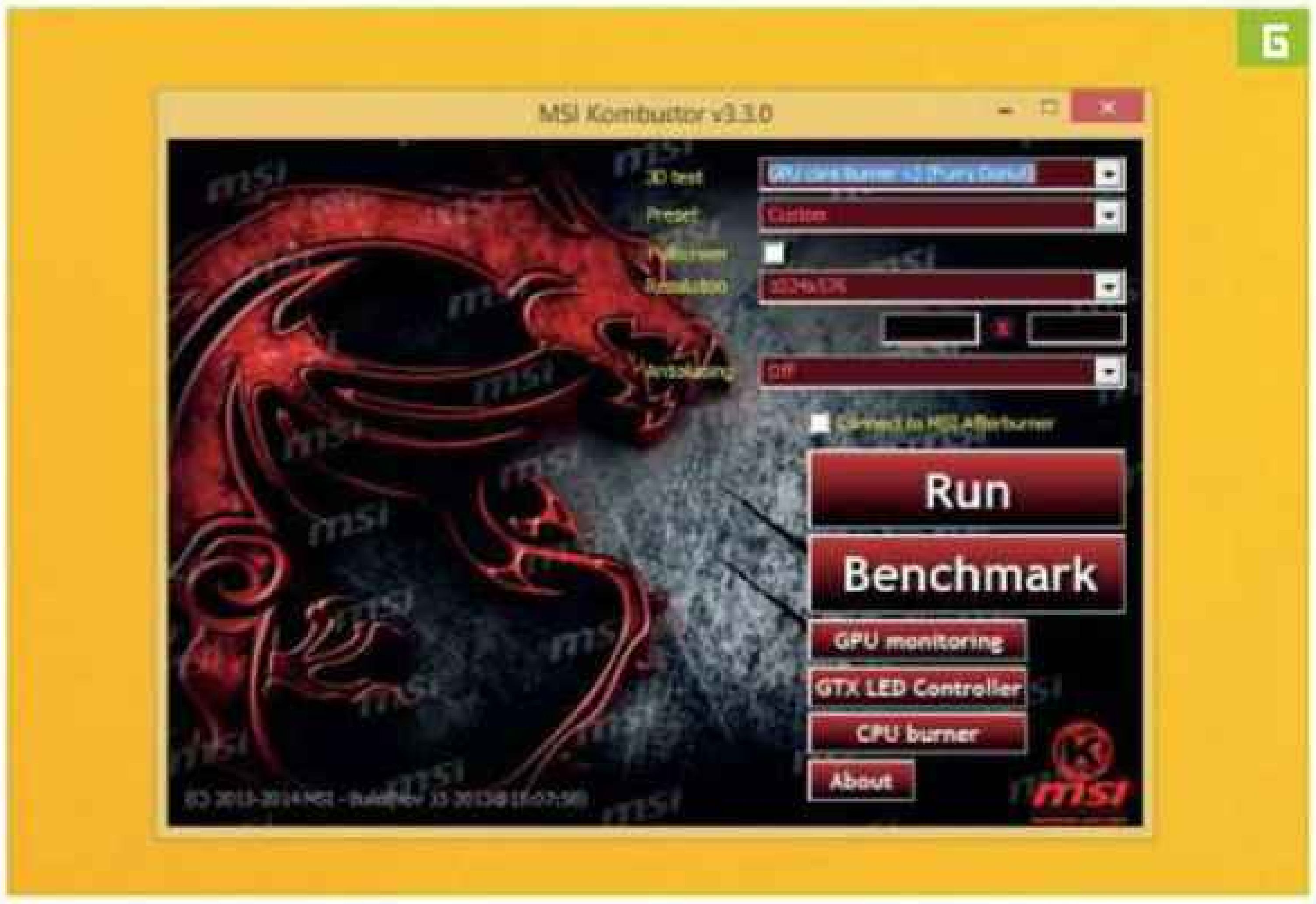
4 STRESS TESTS

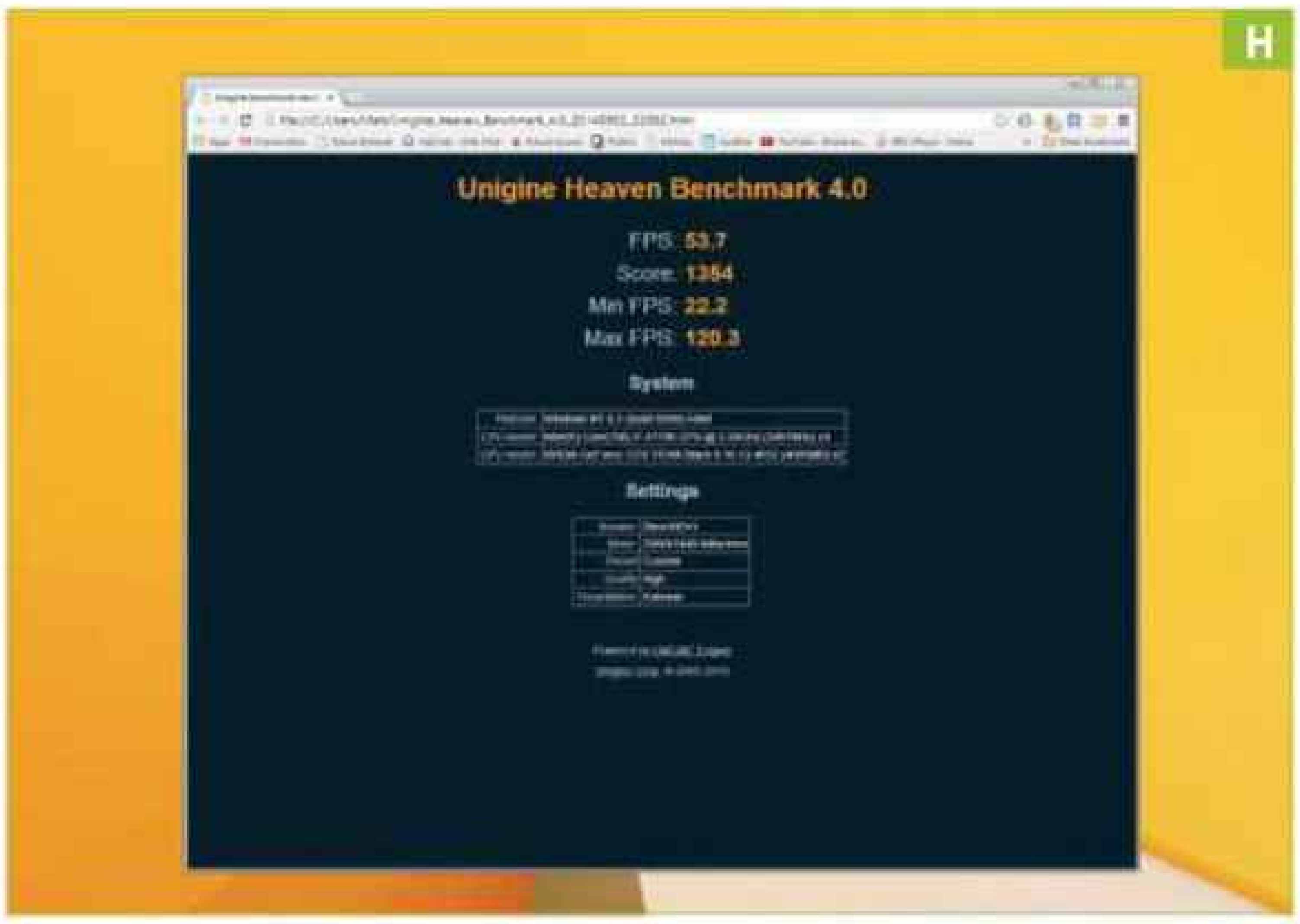
It's vital you put your overclock through its paces, so fire up Heaven Benchmark again (**Image F**). This time, however, don't start the benchmark option. Just let it continue running—the longer you leave it, the more certain you can be that your system is stable. We recommend at least four hours. You don't need to sit glued to your monitor, but look out for artefacts and errors. If your PC is OK after that, you can be confident about your overclock.

» While using Afterburner, you may have noticed a grayed-out "K" on the left. This links to MSI Kombuster (**Image G**), a tool for stress testing your overclocked GPU. To download and install the program, head to http://bit.ly/PCFkombustor; then the "K" icon in Afterburner will be highlighted. This program has a number of heavy-duty benchmarks, which really push your GPU and its overclock. If it survives these, it bodes well.

» Run Heaven again and save the results (they're saved as an HTML file). Open them up and compare them to the results you saved from the test you ran before you started overclocking (**Image H**). You can see the benefits the overclock has provided, including a higher score and higher fps. Another good benchmark is 3DMark (www.3dmark.com). Some games come with their own benchmark utilities as well.

» Now comes the fun part (**Image I**), as remember the point of overclocking your graphics card is to get improved performance in games. Load up your favorite games and have a play. Hopefully, you should notice frame rates are a lot smoother. You may even be able to increase the graphics settings. Download Fraps from www.fraps.com to see how your frame rates are performing.





Unigine Heaven Benchmark 4.0

FPS: 53.7
Score: 1354
Min FPS: 22.2
Max FPS: 120.3

System

Settings

KEEP THINGS COOL

When overclocking your graphics card, it produces more heat than when running at stock speeds, so you must make sure it doesn't overheat. Keeping the mass of wires and cables under control works wonders for airflow, which is essential for keeping the components cool.

Many PC cases enable you to route your cables and wires behind the motherboard, giving your components room to breathe. Speaking of cases, yours should be a decent size, because small cases can get too hot when overclocking. Graphics cards usually come with their own fans and heatsinks. These are fine for stock speeds and even overclocking, but if you're going to be doing some heavy-duty overclocking, video editing, and gaming, you may want to buy some aftermarket coolers for your GPU.

Alternatively, you can incorporate a liquid cooling system to keep your processor and GPU cool.

Liquid cooling is fiddly and expensive, but looks great.

Secure Your Wireless Network

YOU'LL NEED THIS

ROUTER FIRMWARE
Download from manufacturer.

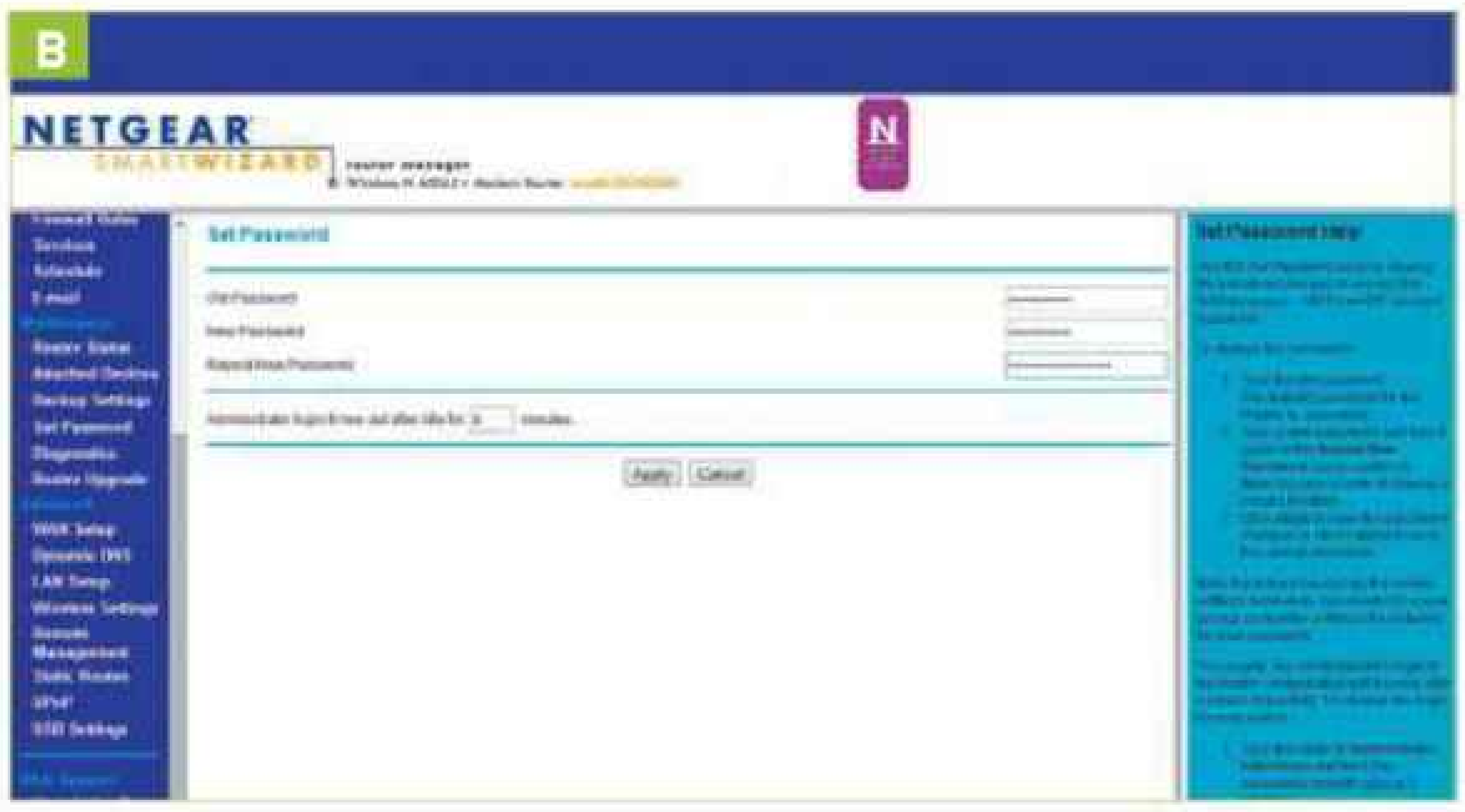
SECURING YOUR NETWORK BEYOND THE PASSWORD LEVEL seems like a chore. But with so many wireless devices just feet from your property, you need to go further to really protect your privacy. At the core of most home Wi-Fi networks is a router, which sends data between wireless devices and the Internet. To set up your router, you must access the admin panel through a web browser. This is where you enter your network address and account information. The admin panel is protected with a username and password, but that's just the first level of security. –**CHRISTIAN HALL**

1 PROTECTED SETUP AND UPDATED FIRMWARE

If updating your router, your new device will follow either the 802.11n or 802.11ac specification. It will almost certainly come with WPS (Wi-Fi Protected Setup), usually a button that lets you skip password setup until you've securely logged into the admin panel (**Image A**). Older routers can develop security issues as you attach new devices, so check the manufacturer's site for a firmware update.

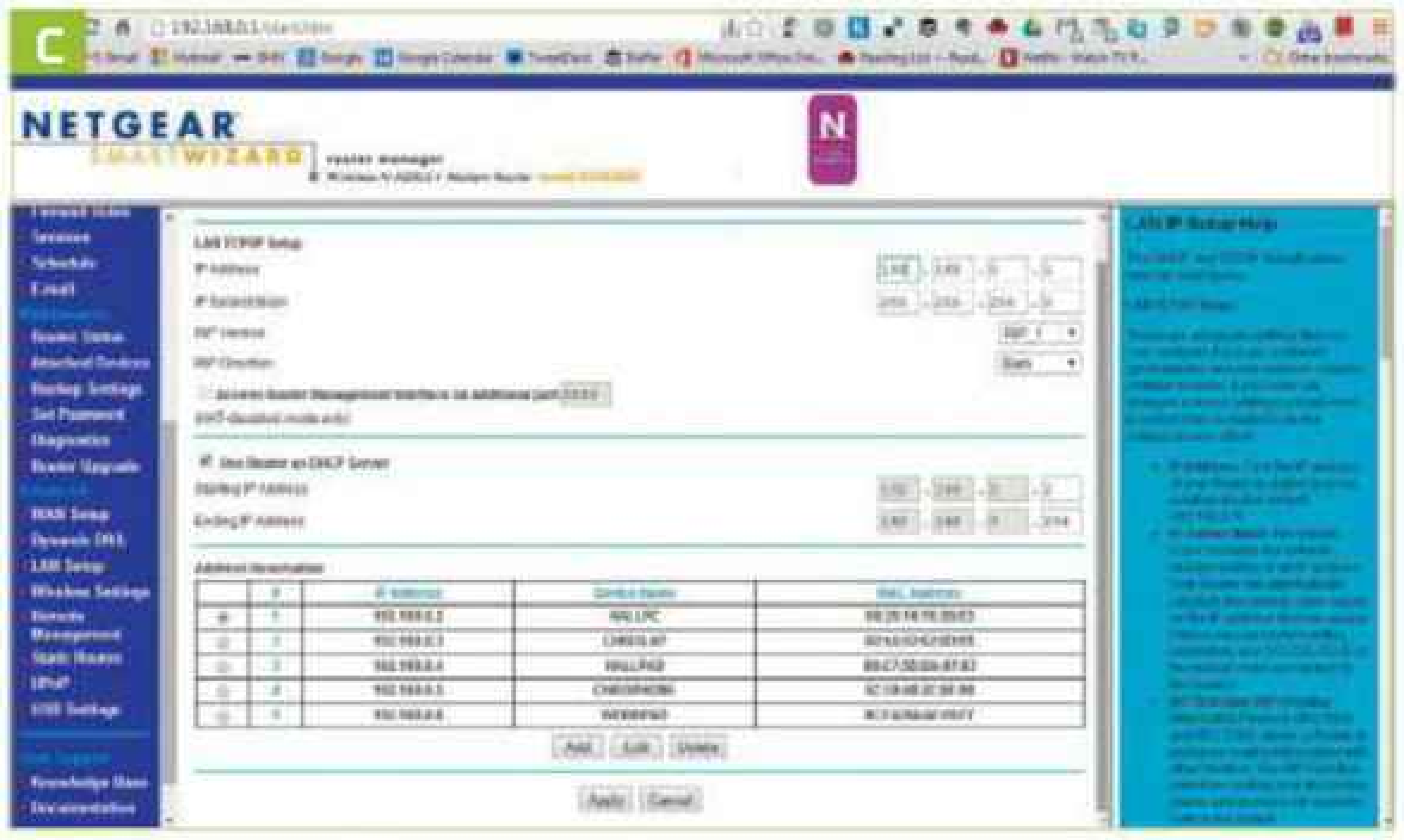
2 PASSWORDS AND SSID

You'll have to configure security options again after rebooting your router following a firmware update. We recommend using WPA-PSK or WPA2, and a new password that includes both letters and numbers (**Image B**). By default, routers broadcast their ID, but it's easy to stop. In your router's admin panel you'll find an option to stop broadcasting the SSID (service set identifier). To connect, you'll need to enter both the name and password; it won't appear on the list of available networks.



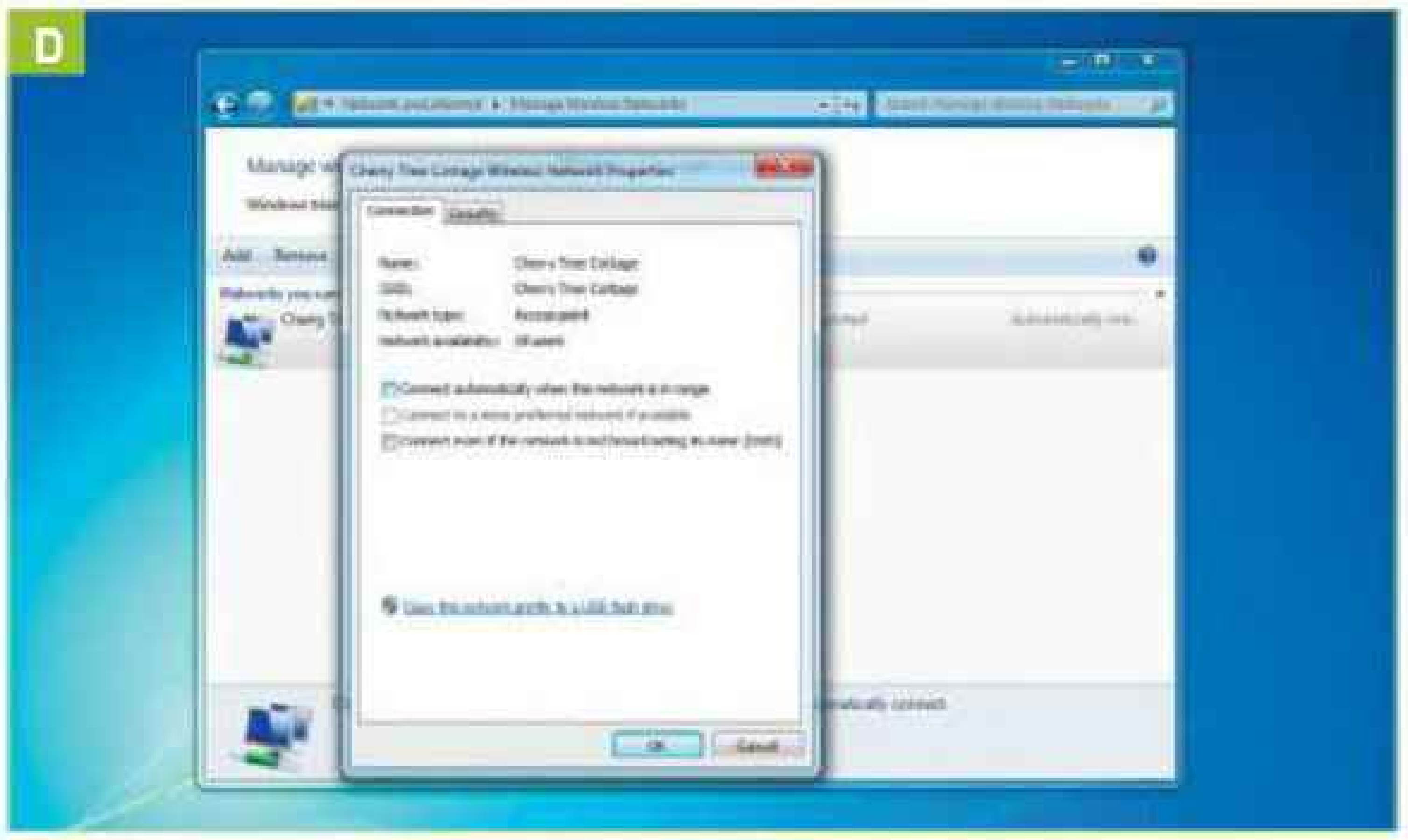
3 MAC FILTERING

Your network will be faster, more reliable, and more secure if you give each device a static IP address, so you can easily see which devices are connecting. For a simple guide, see http://bit.ly/1pQNEa1. Create a list of MAC addresses for your devices (**Image C**), only allowing these to connect while blocking unrecognized devices. Look for an address filtering option in your router admin panel. To find the MAC address for a Windows PC, type "getmac" in the Command Prompt.



4 DISABLE AUTOCONNECT AND WIRELESS ADMIN

Connecting to open Wi-Fi networks exposes your PC. Disable this by clicking "Control Panel → Network and Sharing Center → Manage Wireless Networks." Right-click the one you want to change, click "Properties → Connection" and uncheck "Connect automatically" (**Image D**). Restrict router admin through a wireless connection to stop wireless hacking. ⏻



BUILD IT

TOM MCNAMARA **TECHNICAL EDITOR**

We're Gonna Need a Bigger Boat...

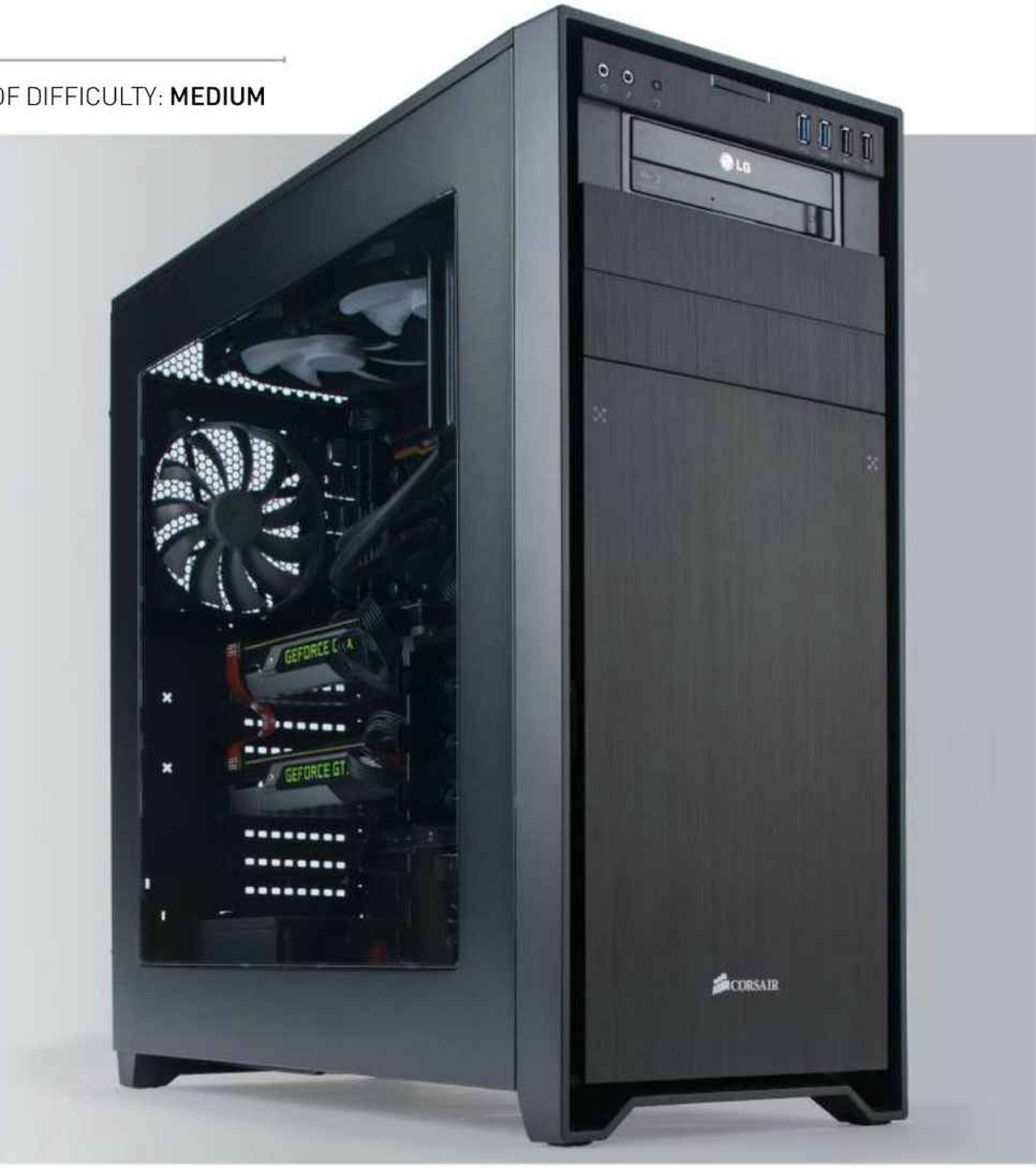
We link up Intel's 6-core Haswell-E with a pair of GTX 980 cards and discover that when in doubt, add more power

LENGTH OF TIME: **2–4 HOURS** | LEVEL OF DIFFICULTY: **MEDIUM**

THE MISSION

AS MUCH AS WE LIKE DOING exotic things like dunking computer parts in mineral oil or cramming them into a case the size of a cigar box, it's also good to return to our roots and do some more conventional systems. But since this is still *Maximum PC*, we're not going to just sweep up some leftover bits and slap them together. We try to be educational as well. We want to simulate choices that more sane people would undertake. And we know that when you open up the pages of this magazine, one of your purposes is market research. "Should I buy X, or Y, or should I wait for Z to come out?"

So that's why we're assembling something nice and fancy, but not too weird to live. We're taking Intel's 6-core Haswell-E CPU for a spin and testing it with two GeForce GTX 980 video cards, a premium 1TB solid-state drive, and a full-tower case from our friends at Corsair. And along the way, we got a little educated ourselves.



OF MICE AND MECH

NVIDIA'S GTX 980 CARDS were at the top of the heap as this issue went to press (though AMD's Mantle API has been making some impressive inroads). We've tested it before, but we haven't used it in a multicard build until now. They're still a bit difficult to find due to their popularity, but Nvidia sent us an extra one to work with. It's the "reference" version instead of the kind with the fancy cooling, but we can hardly complain. The reference model uses the "blower" style cooling design that the company introduced with the GTX 780 in May 2013. It can't overclock as high as cards with third-party cooling, but it has certain other advantages that we'll get into later.

Intel's Core i7-5820K CPU is the beating heart of this machine, sitting on top of a Gigabyte GA-X99-UD4 motherboard and cooled by an NZXT Kraken X61. The 5820K has six CPU cores and 12 threads, and it has 28 PCIe lanes available, compared to 16 lanes for the LGA 1150 platform used by regular Haswell chips such as the i7-4770K. This 2011-3 mobo also requires DDR4, which is more expensive but also faster. For storage, we dropped in a 1TB Samsung 850 Pro SSD. It's a premium part, but we wanted to have a little fun. Powering everything is a "gold" rated 730-watt Enermax Revolution XT. And housing everything is the Corsair Obsidian 750D.

INGREDIENTS

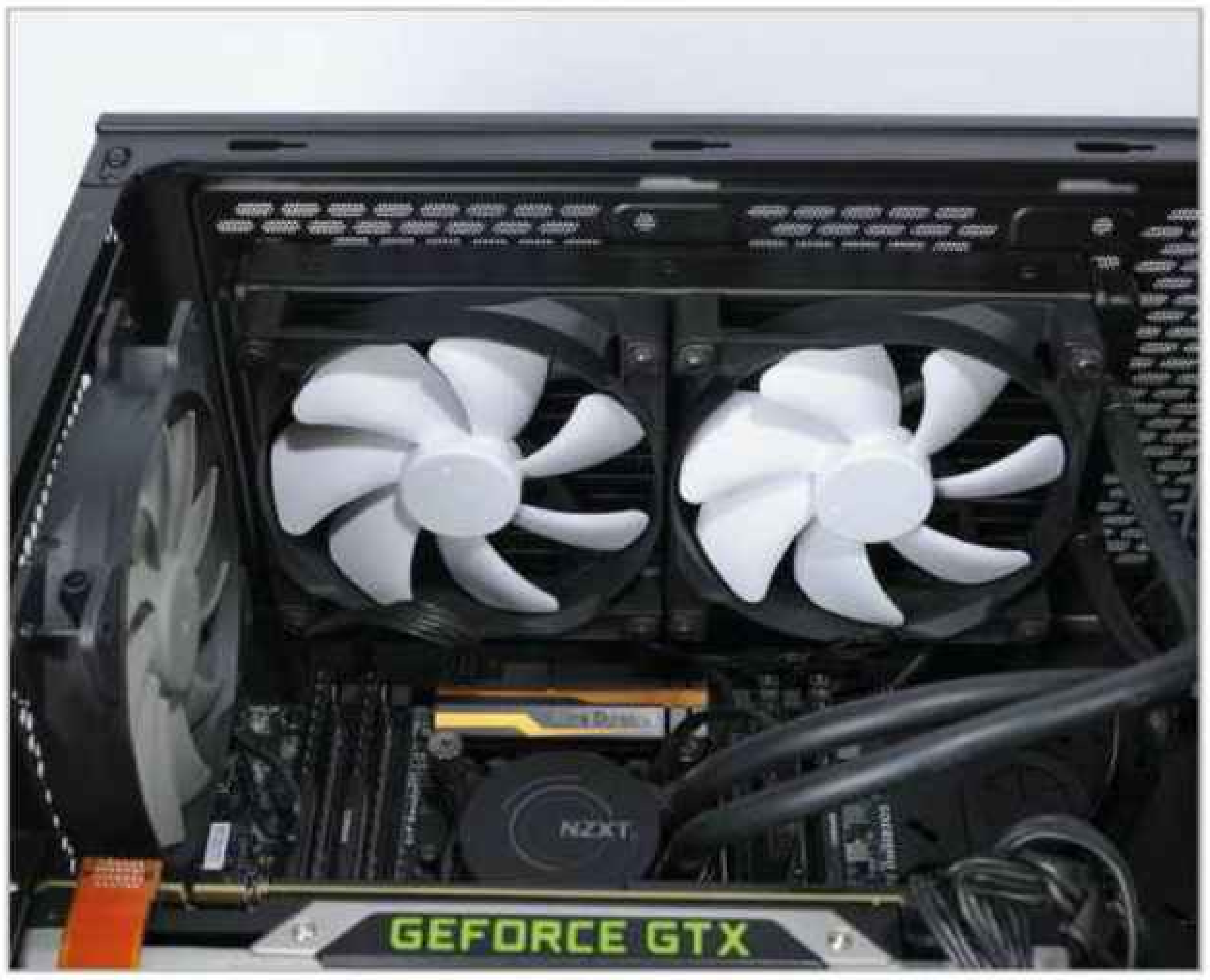
	PART	PRICE
Case	Corsair Obsidian 750D	$150
PSU	Enermax Revolution XT 730W	$120
Mobo	Gigabyte GA-X99-UD4	$250
CPU	Intel Core i7-5820K	$380
CPU Cooler	NZXT Kraken X61	$100
GPU	2x Nvidia GeForce GTX 980	$1,100
RAM	4x 4GB Corsair Vengeance LPX DDR4/2133	$300
HDD	3TB Seagate Barracuda	$100
SSD	1TB Samsung 850 Pro	$700
Cable	3-pin fan extension	$3
OS	Windows 8.1	$100
Total		$3,303

1

GETTING ON BOARD

COMPARED TO INTEL'S previous X79 platform, the biggest deal with X99 is arguably the addition of two extra CPU cores. The 5820K has six, whereas the 4820K had four. At the top end, the 5960X has eight, whereas the 4960X had six. The upshot? More heat generation.

Intel tends to improve this aspect from one generation to the next, but it's hard to absorb the addition of this much horsepower. That means we want a beefier CPU cooler than usual. That's where NZXT's Kraken X61 comes in. This cooler has a 280mm radiator, whereas the upper range usually sits at 240mm. The extra surface area dissipates heat faster (and these 140mm fans are quieter, too).

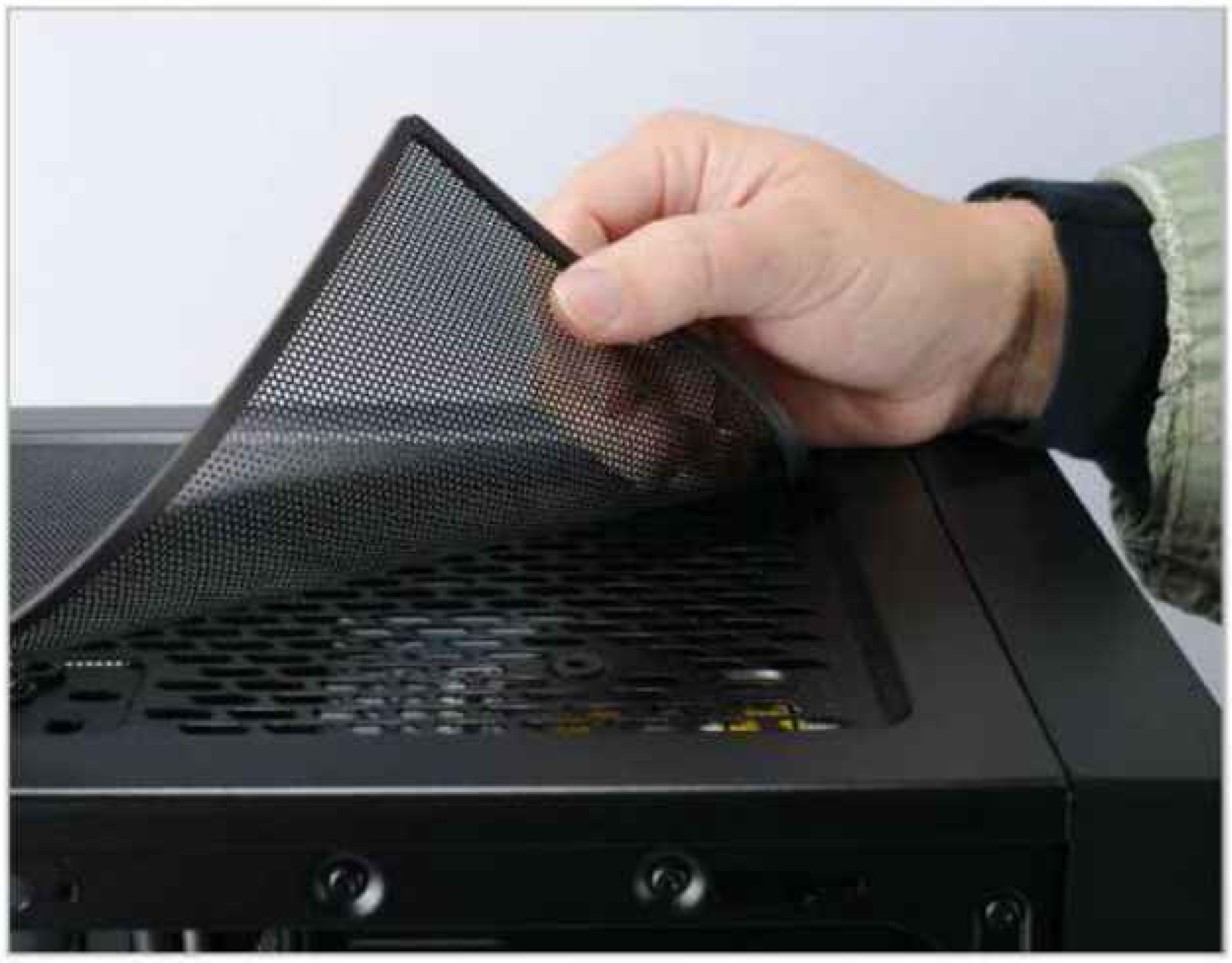


2

COLD CASE

THE CORSAIR 750D case design also helps. When you're ready to screw the Kraken X61's radiator into the top, just peel back this filter to access the mounting holes underneath. This bendy metallic material is fringed with an equally bendy magnetic strip all the way around.

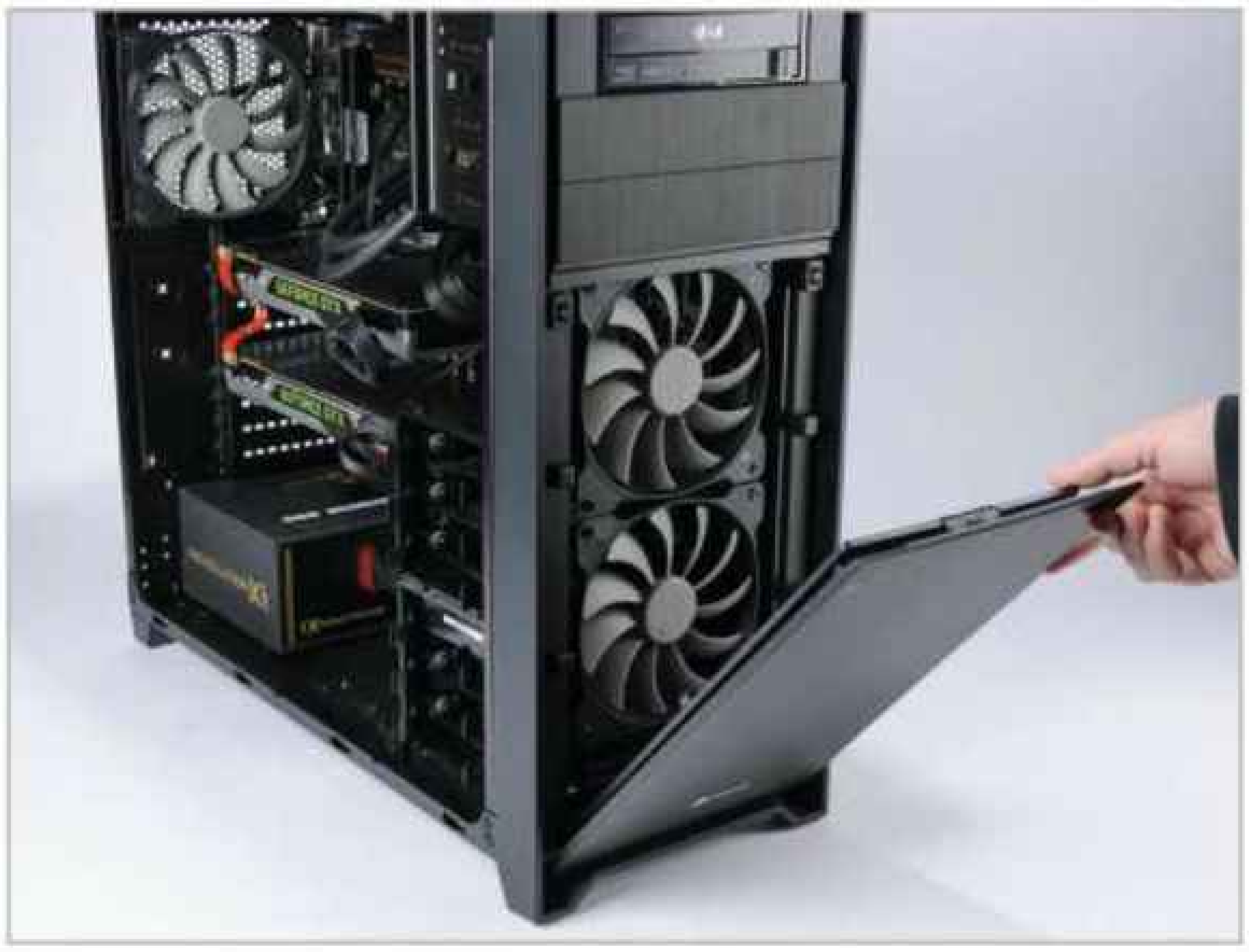
We've seen this trick before in Corsair's 900D. It's nice to see them continue with this design element, since it makes the filter easy to remove but maintains clean lines. The top of the case will take a third 140mm fan, but the 5.25-inch drive cage would block a 360mm or 420mm radiator. You can also install a single 200mm fan, or up to three 120mm fans. We installed the X61 with the tubing facing toward the front, so we wouldn't block the airflow of the stock 140mm exhaust fan.



3

FULL FRONTAL

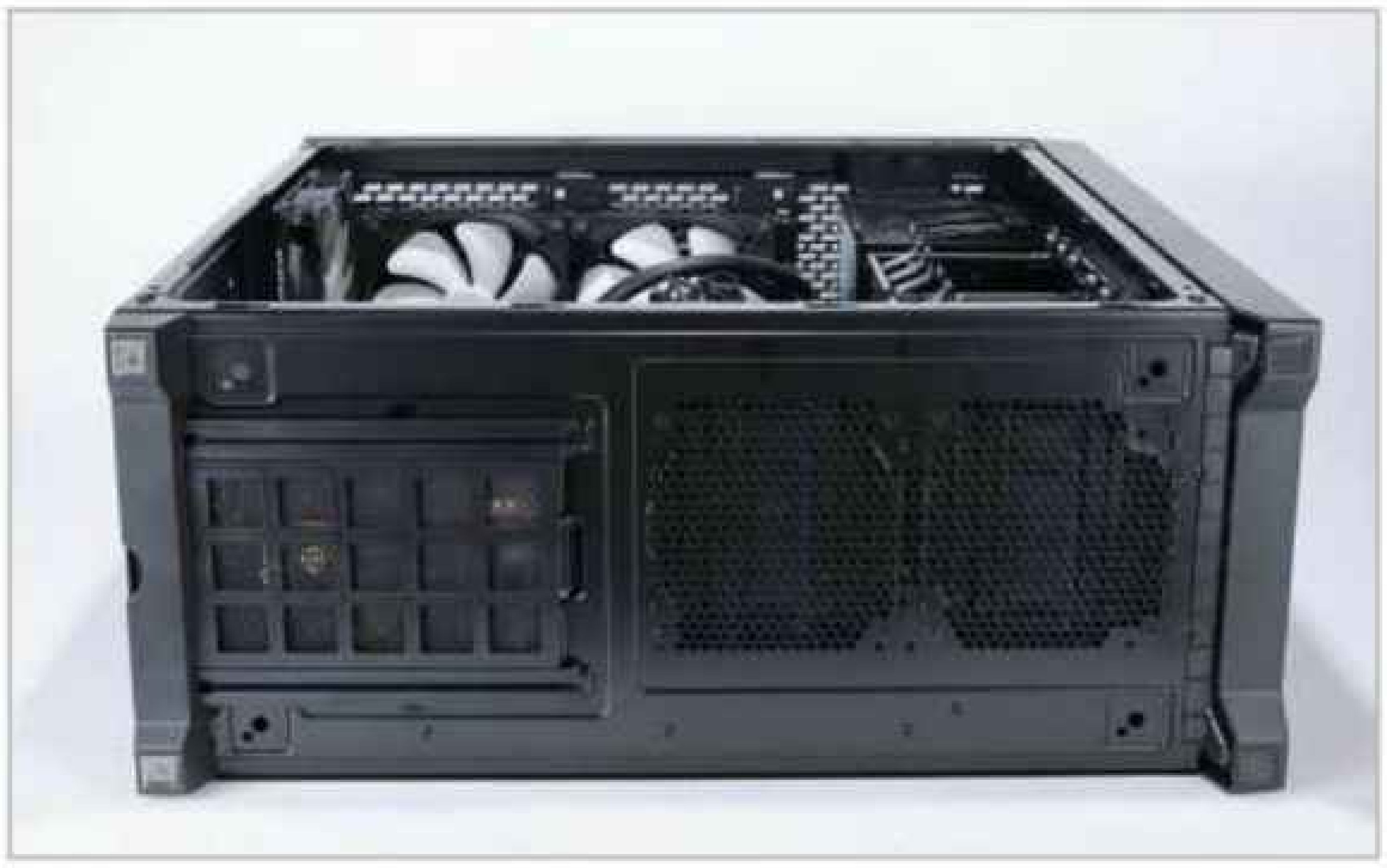
THE FRONT OF THE CASE is also worth a gander. The aluminum face has two upper corners, just below the lowest 5.25-inch drive, that you press to release the front bezel. That reveals another removable fan filter, behind which are two pre-installed 140mm intake fans. However, their cables aren't very long. If your motherboard doesn't have fan headers on the near side, you'll need an extension cable, a Molex adapter to plug the fans directly into the power supply, or a fan controller installed in one of the 5.25-inch drive bays. We used an extension, which you can get from Newegg or Amazon for a few dollars.



4

BOTTOM'S UP

FINALLY, THE BOTTOM OF THE CASE. This is interesting because there's not one but two 140mm fan mounts down here. Since they're adjacent, you could stick a second 280mm radiator down here, if you wanted. Why would you want to? Well, if you're doing full-fledged liquid cooling, two 280mm radiators in a case (one on top, one on bottom) is not a bad start. Some gearheads also modify their video cards to add a closed-loop liquid cooler, making this a convenient location to mount the radiator. The mount closest to the front of the case isn't immediately accessible, though, because there's a drive cage there. However, this cage can be installed right under the 5.25-inch drive bay to clear the way. To the left of the fan mounts is yet another removable air filter, this time for the intake fan on your power supply.



5

FOUR MORE TO STORE

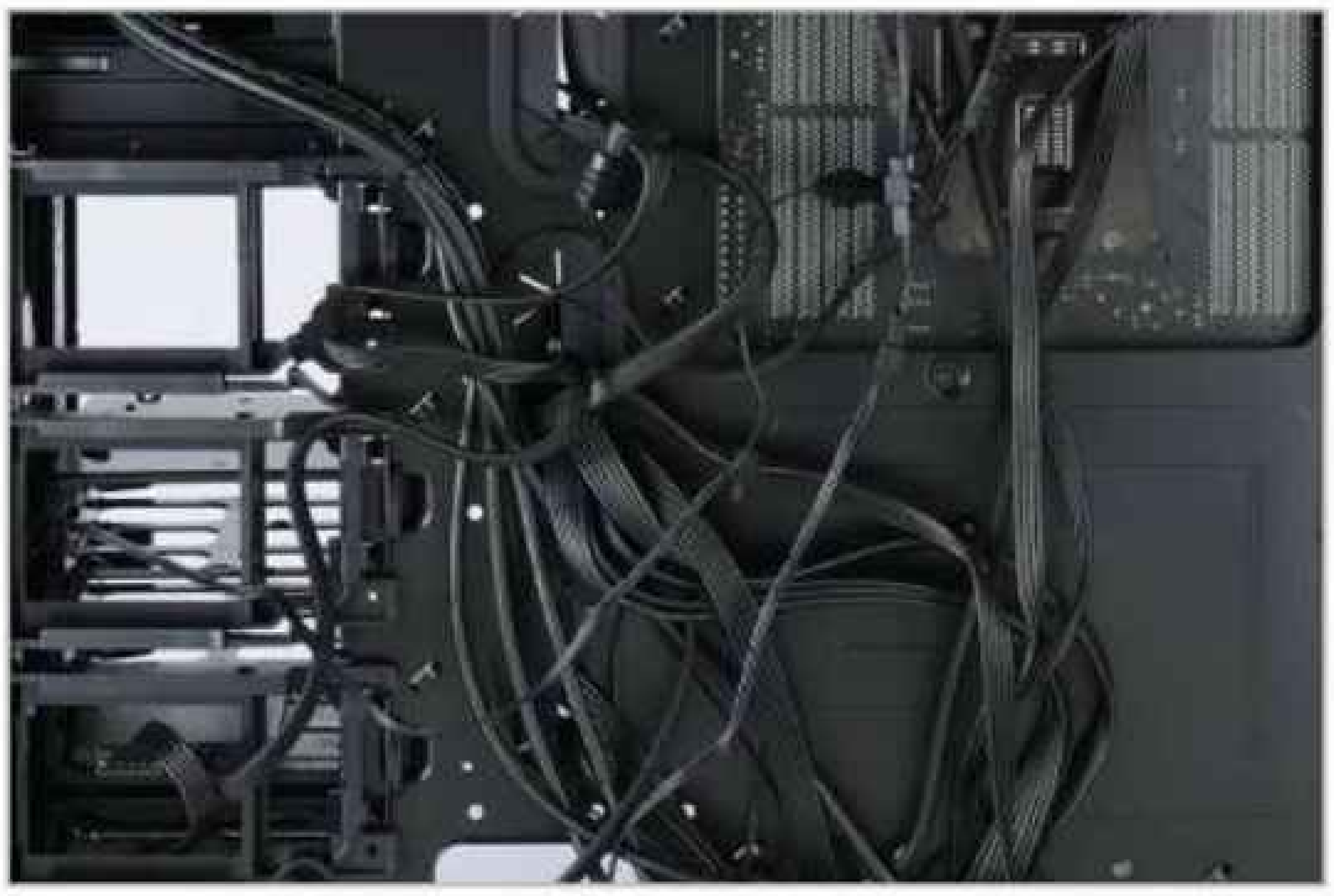
IF YOU ONLY HAVE 2.5-INCH drives, you can remove the 3.5-inch cages altogether. So much room for activities! We chose to use the cages so that you could see the conventional look, with one mechanical drive in one cage and one SSD in the other. But the Corsair 750D case also has four of these brackets on the other side of the drive cages. These brackets snap in and out, and they can each hold one 2.5-inch drive—no screws required. (Each bracket has two screw holes, but they're not really necessary, since the fit is quite snug.) Since you can get 1TB SSDs and 2TB 7,200rpm drives, there's a lot of storage that you could cram in here without taking up much space inside the case.

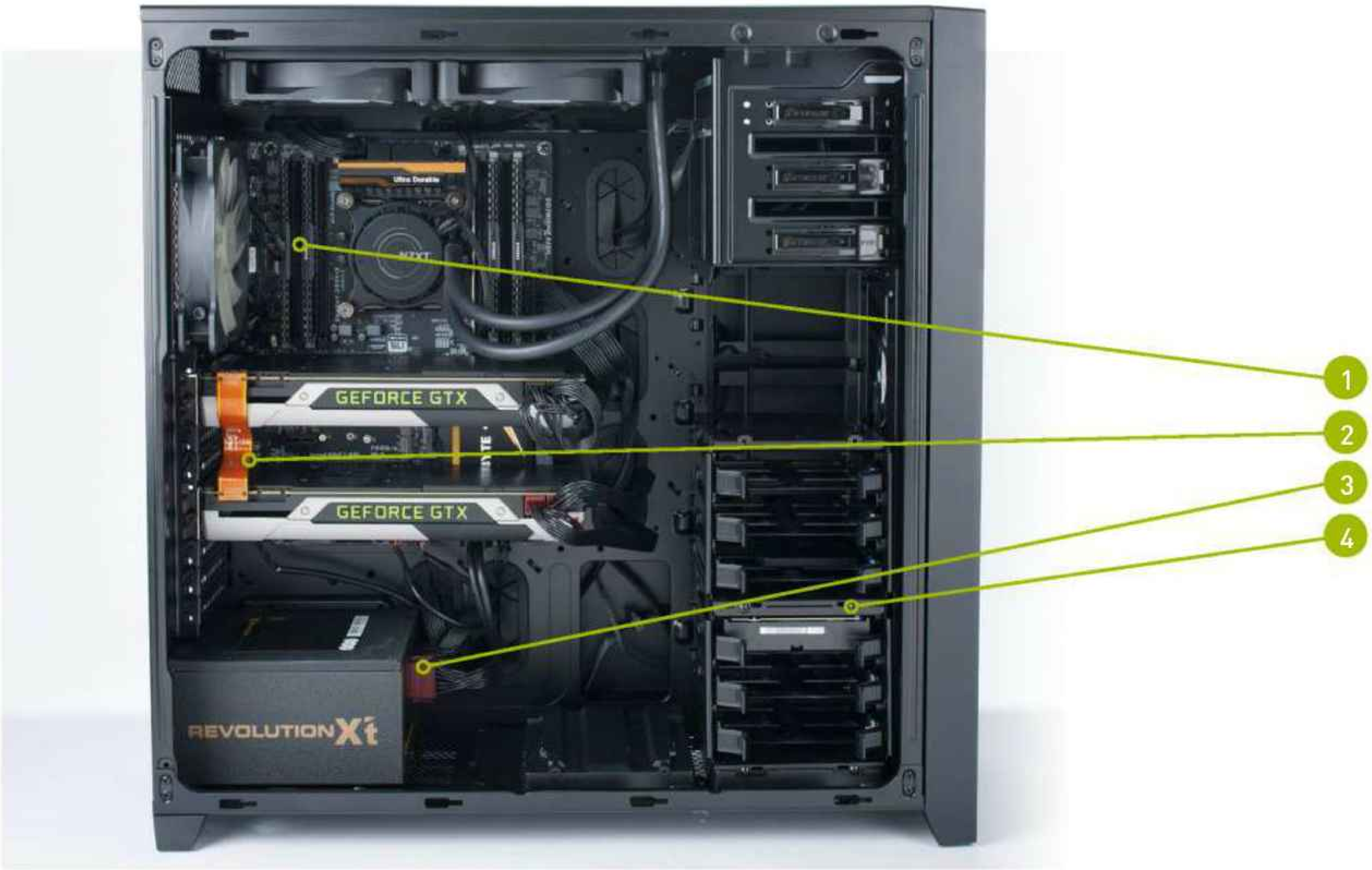
The Gigabyte motherboard itself also has an M.2 slot for more low-profile solid-state action. Since this is a full-tower case, there's enough space behind the motherboard to wrangle SATA and power cables in this section.

6

FEELING ELECTRIC

WITH TWO VIDEO CARDS IN PLAY, a couple of storage devices, and a CPU cooler that uses a SATA power connector, there's a lot of cables. The Enermax Revolution XT is a modular power supply, but we added the Molex cable so you can see how messy things could get. You might also wonder why we went with a modest 730 watts. It turns out the GTX 980 cards have a TDP of just 165 watts. In total, this system will use less than 600 watts before OCing. But we can see an argument for beefing it up, so we'd probably upgrade to an 850-watt XFX ProSeries or a SeaSonic X-850. You could save cash with a Radeon R9 290 or 290X, but a Crossfire build would demand an upgrade to 850 watts, since those cards have TDPs of about 250 and 290 watts, respectively.





1. This is a 2011-3 mobo, so you get a whopping eight RAM slots. The chip works best when its RAM is in sets of four.

2. When using multiple Nvidia video cards, attach the SLI bridge between them, so they can coordinate their workload.

3. This power supply is modular, so cables can detach from here if you don't need them. This reduces case clutter.

4. The 750D's drive cages can be removed, once you take out these screws. That can create room for things like reservoirs and pumps.

SHAKEN, NOT STIRRED

WHENEVER YOU WRASSLE with a new mobo chipset, expect to get bumped and bruised. At first, we had serious issues with stability. Was something loose? Was there a short circuit? We went the conventional route of removing everything not required to boot Windows, stripping down to one stick of RAM, one storage device, and one video card. Still no luck. We installed Intel's chipset drivers and management engine, and that didn't fix it. We looked up the mobo on Gigabyte's website and noted there was a BIOS update to fix crashes when things were plugged into the board's front USB headers. We unplugged the devices we'd connected there, and still no dice. It wasn't until we updated the board to the latest BIOS (version F9C) that our issues went away.

As advertised, the Kraken X61 CPU cooler was able to keep this six-core chip's temperatures under control without getting too noisy, despite us overclocking to 4.3GHz on all cores. The i7-5820K has a default clock of 3.3GHz and a "turbo boost" of 3.6GHz, but the boost only applies to two cores. The other four cores run at up to 3.4GHz. So pushing that up to 4.3GHz on all six is a pretty respectable upgrade.

These video cards, on the other hand, won't meaningfully benefit from overclocks. That's because these reference versions already hit the card's thermal limit of about 81 C. Increasing clock speeds ups heat, so a GPU overclock here basically won't have an effect. On the flip side, these cards have "closed" shrouds, so all the air moved around by the video card's fan will get pushed out the back of the case—as does a lot of the heat. Some will still rise off the top of the cards, but our stock 140mm exhaust fan is more than up to the task.

Overall, this felt a solid build, once we'd fixed the crashiness. The i7-5820K is quite a workhorse for the price (though we had some oddness with ProShow), dual GTX 980s crush benchmarks, and the 750D case has a lot of expansion room for extra storage, cooling, and video cards. But if we did it again, we'd go with a larger power supply, just to be safe.

BENCHMARKS

	ZERO-POINT	
Premiere Pro CS6 (sec)	2,000	1,582
Stitch.Efx 2.0 (sec)	831	754
ProShow Producer 5.0 (sec)	1,446	1,452 (-1%)
x264 HD 5.0 (fps)	21.1	26.9
Batman: Arkham City (fps)	76	141
3DMark 11	5,847	10,627

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our current desktop test bed consists of a hexa-core 3.2GHz Core i7-3930K, 16GB of Corsair DDR3/1600, on an Asus Sabertooth X79.

GIGABYTE™

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BORN TO GAME

GeForce GTX 900 Series

G1™ GAMING

Graphics Cards

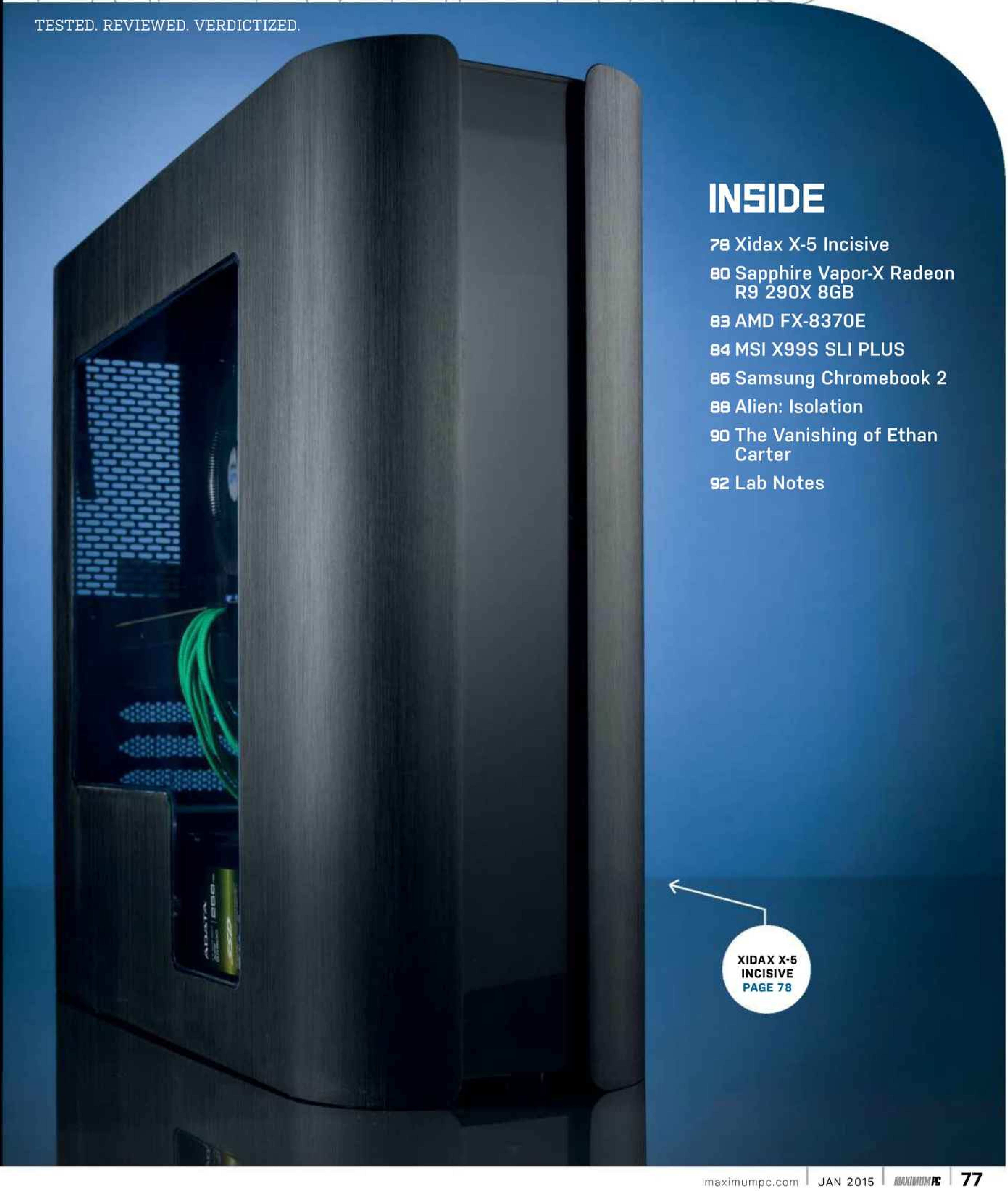
SUPER OVER CLOCK

FLEX DISPLAY

WINDFORCE

REVIEWS

TESTED. REVIEWED. VERDICTIZED.



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XIDAX X-5 INCISIVE
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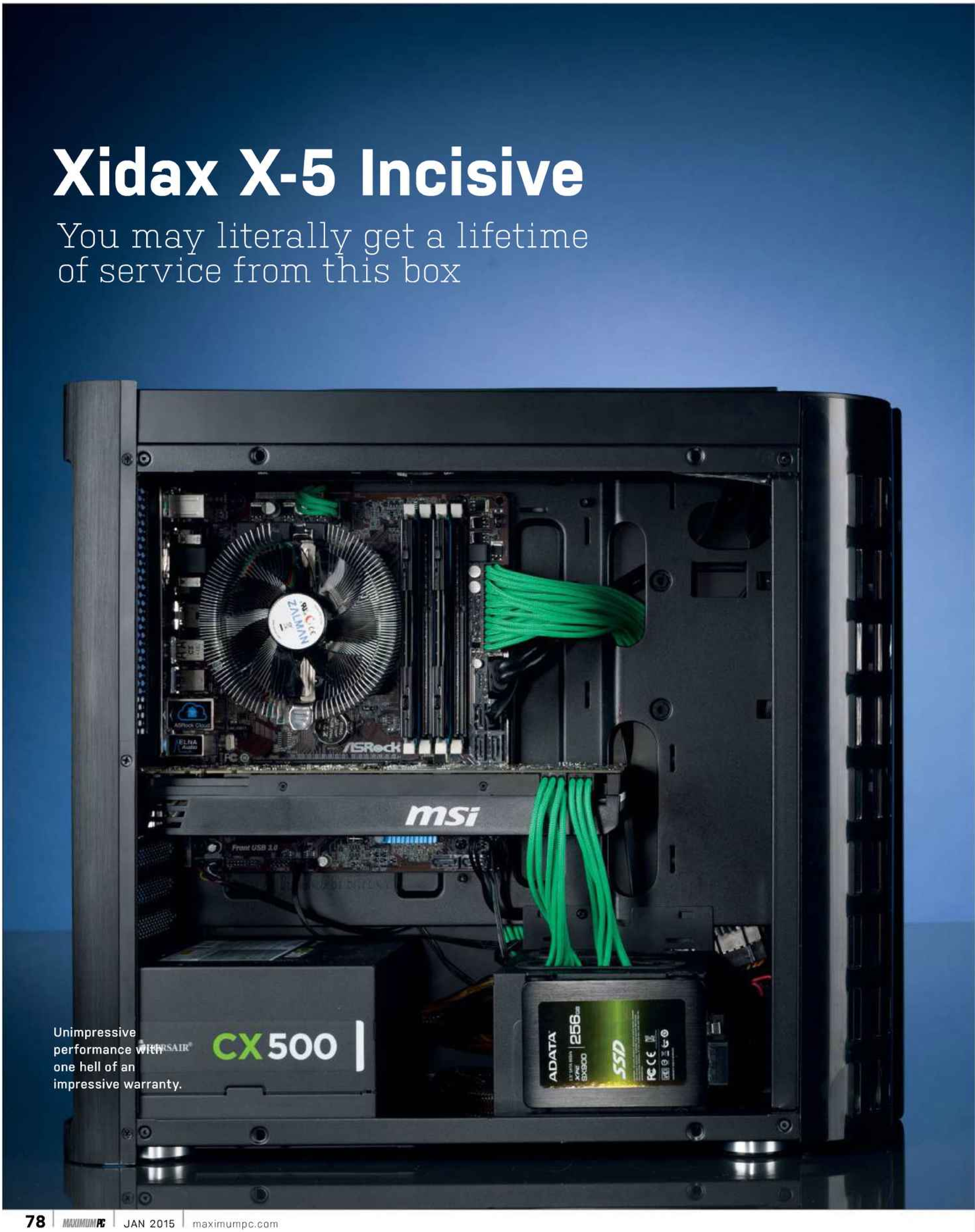
Xidax X-5 Incisive

You may literally get a lifetime of service from this box



Unimpressive performance with one hell of an impressive warranty.

IF THERE'S ONE LESSON we've learned in life, it's this: Don't create false dichotomies. You know, such as: "There are only two kinds of *Maximum PC* readers: those who like to see, buy, and read about $12,000 PCs, and those who only want to hear about the budget rigs that you can actually afford."

Since we've already created that false dichotomy, we'll just roll with it. For the guys and gals who want to see something that's budget and different, Xidax has your number and is texting you as we speak. And we can honestly say Xidax's X-5 Incisive is truly different for us. To understand what Xidax was trying to pull off with the Incisive, you have to get that it's not just any budget build here. It's one intended for a budget gamer. That means there's no fancy six-core Haswell-E Core i7-5820K, DDR4, or four-way GPUs here. In fact, it may surprise you but there isn't even a quad-core inside. Instead, Xidax outfits this machine with a dual-core 3.7GHz Core i3-4360 part. Yes, an air-cooled *dual-core*. Xidax said it toyed with the idea of an overclocked Pentium Anniversary Edition but it saw bottlenecks in some games from the lack of Hyper-Threading on that chip.

On the other side of the PC equation, Xidax hopes to nullify your concerns over CPU performance with the new hotness: Nvidia's GeForce GTX 970 card. This "budget" card is currently making the rounds as the card to have, thanks to its price-to-performance ratio. The rest of the machine is well-apportioned—for a budget box, that is. There's a 256GB ADATA SSD, 500-watt Corsair PSU, Asrock Z97M Anniversary board, and 8GB of DDR3/1600. The case is a BitFenix Pandora Window. This is the first time we've laid eyes on the micro-ATX Pandora, but we like what we see. It's a fairly narrow case but has a few nifty features such as a brushed-aluminum sidedoor that pops off without having to unscrew it (and top, too), and a handy front LCD screen. The screen is a 2.4-inch TFT that shows the BitFenix logo—or any image you decide to drop into it.

WE'VE GOT YOU COVERED

Since performance matters, we can't review this rig without comparing it to our standard zero-point—a six-core Sandy Bridge-E box with a dual-GPU GeForce GTX 690. There are two ways to look at how the Incisive did. You can glance down at the chart and see that a dual-core—even Intel's newest Haswell core—isn't going to put a dent into a six-core chip in our benchmarks. In some ways it's not as bad as you'd expect, considering it's two cores against six—but then, it didn't win anything, either. The GeForce GTX 970 does OK, though. It's really only about 20 percent slower than the GeForce GTX 690. In the real world, this machine should be able to comfortably play every modern game at 1080p at or near 60fps, which was Xidax's aim with the machine.

Xidax has one more thing to entice you with this budget rig: a "real" lifetime warranty. The company says it will cover every component for life. That means if the GPU (well, except for AMD GPUs, which are only covered for two years due to Bitcoin mining abuse) nukes itself in 10 years, you'll get a replacement. Some will scoff that a lifetime warranty means for the life of the company, but Xidax isn't a newbie business. It's backed by PC Laptops, a company that's been in business for 21 years. We looked around and it's true, we couldn't find any other vendor that offered such an aggressive warranty. Even high-end boutique PC vendors aren't as generous with a warranty, so such a promise is truly different.

The warranty doesn't give the box a free ride with us, though. While we get what Xidax was trying to do, we gotta say, corners could have been cut to get other components into this rig. We would have liked a motherboard that would at least offer the option for SLI support, even if it means swapping out the PSU down the road. And while a dual-core will work for most, it's probably only $75 away from a K SKU quad-core and $35 away from a locked quad-core chip. As much as we know Xidax wanted to keep the box to a usable $1,200, a dual-core in this world just feels odd.

The price itself is actually good at $1,200, though. We priced similar builds from higher-volume system builders and the difference was nil. And yes, we priced it out at retail, too, to the same effect. And none of those offered lifetime warranties, either. **–GORDON MAH UNG**

VERDICT 8

Xidax X-5 Incisive

+ XENON A lifetime warranty that is actually lifetime.

– XENU Dual-core feels simply quaint.

$1,200, www.xidax.com

BENCHMARKS

	ZERO-POINT	
Premiere Pro CS6 (sec)	2,000	5,246 -62%
Stitch.Efx 2.0 (sec)	831	1,144 -27%
ProShow Producer 5.0 (sec)	1,446	1,761 -18%
x264 HD 5.0 (fps)	21.1	8.3 -61%
Batman: Arkham City (fps)	76	59.0 -22%
3DMark 11	5,847	4,637 -21%

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our current desktop test bed consists of a hexa-core 3.2GHz Core i7-3930K 3.8GHz, 8GB of Corsair DDR3/1600, on an Asus Sabertooth X79 motherboard. We're running a GeForce GTX 690, an OCZ Vertex 3 SSD, and 64-bit Windows 7 Professional.

SPECIFICATIONS

CPU	Intel 3.7GHz Core i3-4360
Mobo	Asrock Z97M Anniversary
RAM	8GB ADATA DDR3/1600
GPU	MSI GeForce GTX 970
Storage	ADATA 256GB SSD
Optical Drive	None
Case/PSU	BitFenix Pandora Window / Corsair CX50

Sapphire Vapor-X Radeon R9 290X 8GB

The freaks come out at night

The backplate and beefy heatsink make this card about 20 percent heavier than the reference model.

SOMETIMES, AT THE TAIL end of a generation of GPUs or CPUs, you see something a little exotic get to retail shelves, perhaps as a way to boost sales of remaining inventory before the shiny new thing wipes the slate clean. Other times, it's simply a window of opportunity for experimentation. Asus is delivering the Ares III, a Radeon R9 295X designed for custom water cooling and built on a custom PCB. (They're only making 500 of them, though, so good luck tracking one down.) Now, Sapphire has come along with a 290X that doubles the VRAM allotment from 4GB to 8GB.

If this card looks familiar to you, that's because we reviewed a very similar Vapor-X unit back in July 2014. It had a Radeon R9 290 GPU, while this one uses the beefier 290X. The 295X2 mentioned earlier technically has 8GB, but it's a dual-GPU card, so it's effectively 4GB—VRAM contents in this setup just get mirrored instead of added together. So this new Vapor-X is the first one with this much VRAM dedicated to a single GPU. (We hope you're taking notes, there will be a quiz in the morning.)

Like the older Vapor-X, this one has a huge 2.5-slot cooler, so you can't wedge it right next to another one. That makes Crossfire impossible with certain motherboards. Also be aware that this guy is 12-inches long, which may not fit inside some cases. But despite its bulk, the Vapor-X cooler is not tall, so it's easy to screw the card into its bracket. The pre-installed backplate also helps keep it rigid, and that adds a nice aesthetic flair.

This card also sports three big fans, which work in concert with that giant heatsink to keep the card cool in a way that doesn't produce the noise we heard from the "reference" version seen at the launch of the 290/290X generation. This 8GB 290X still doesn't operate as quietly as some other comparable cards we've tested, but you're unlikely to be distracted by it unless you remove the side panel from your case.

THE ADVANTAGE OF EIGHT?

What does 8GB of VRAM do for your rig, though? That's the $64,000 question. If you're gaming at 1080p, probably not anything. We also couldn't detect major differences at 2560x1600. In fact, according to GPU-Z, we were just barely using up 4GB of VRAM even when playing at 4K and applying 4x multisample antialiasing in games advertised to use a lot of VRAM (such as *Shadow of Mordor* with the official HD texture pack installed). Since 4xMSAA is a waste of bandwidth at 4K anyway (options such as SMAA or even 2xMSAA look nearly indistinguishable when screen resolution gets this high), we had trouble figuring out what problem this question solves. Its performance is more or less the same as any third-party 290X that has 4GB of VRAM.

By the time it becomes a good idea to have 8GB, we expect there will be faster video cards on the market. The extra space here may be handy for professionals working with 3D modeling, but those guys are using a different type of card with more highly certified drivers—the kind they need to literally build stuff like bridges, tunnels, and dams. These gaming cards wouldn't be appropriate for that. Thankfully, the financial hit isn't as high as you might guess, with this card coming in at $500—not bad, considering all its features. Its performance is within striking distance of an Nvidia GeForce GTX 980, which was at least $550 as this issue went to press and comes with 4GB of VRAM. **–TOM MCNAMARA**

SPECIFICATIONS

Core Clock	1,030MHz
Video Memory	8GB GDDR5
Output	1x HDMI (with 3D), 1x DisplayPort 1.2, 2x Dual-Link DVI-D
Dimensions H x D x W	1.85 x 4.5 x 12 inches

VERDICT 9

Sapphire Vapor-X Radeon R9 290X 8GB

+ BACON High performance; good cooling; looks nice.

− TOFURKY Relatively bulky; slightly questionable future.

$500, www.sapphiretech.com

BENCHMARKS

	Sapphire Vapor-X Radeon R9 290X 8GB	Sapphire Vapor-X Radeon R9 290 OC	Asus ROG Matrix Radeon R9 290X	MSI GeForce GTX 980 Gaming 4G	GeForce GTX 780 Ti
Tomb Raider (fps)	31	25	26	**35**	26
Metro: Last Light (fps)	31	29	30	**53**	32
Batman: Arkham Origins (fps)	75	62	65	**80**	78
Hitman: Absolution	50	49	**51**	43	46
Unigine Valley 1.0 (fps)	41	39	41	47	**48**
Unigine Heaven 4.0 (fps)	37	34	33	**42**	39
3D Mark Fire Strike	10,382	9,602	9,837	**11,480**	9,976
Price (street)	$500	discontinued	$450	$580	discontinued

Best scores are bolded. Our test bed is a 3.33GHz Core i7-3960X Extreme Edition in an Asus Rampage IV Extreme motherboard with 16GB of DDR3/1600 and a Thermaltake ToughPower 1,050W PSU. The OS is 64-bit Windows 8.1. All games are run at 2560x1600, except for 3D Mark.

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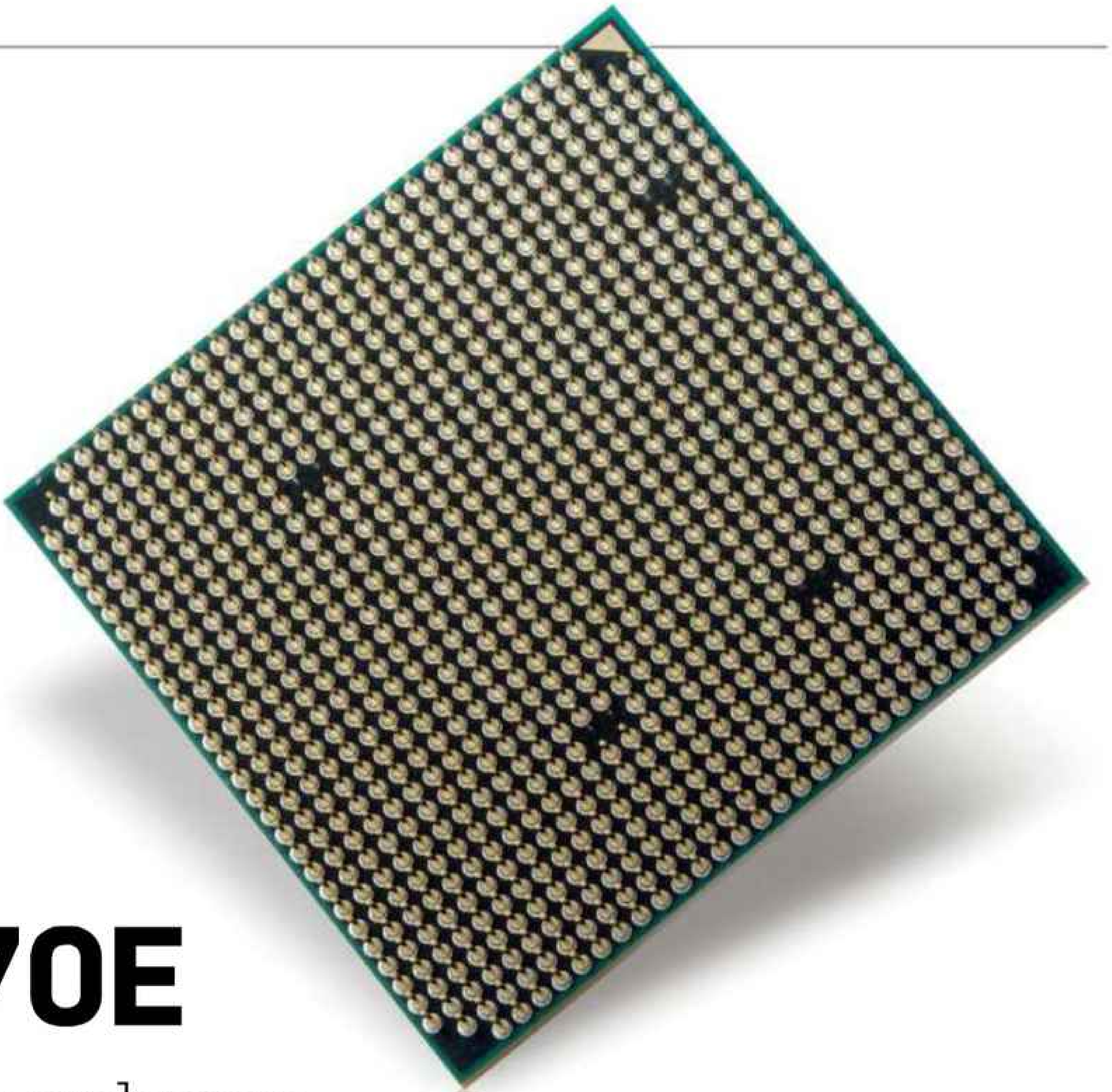


This chip promises lower power consumption, but AMD's aging architecture hampers its ambitions.

SPECIFICATIONS

Base Speed	3.3GHz
Architecture	Piledriver
Cores	8
Memory	Dual-channel DDR3
Socket	AM3+
TDP	95W
Manufacturing Process	32nm

AMD FX-8370E

Chipmaker rejigs old hardware in bid to compete with Intel

AMD HAS CEDED THE CPU HIGH GROUND to Intel's all-conquering i7 chips, but the firm still thinks it can fight in the midrange. And that's exactly where the new FX-8370E hunkers down. This chip is different from the rest of AMD's FX parts thanks to its "E" suffix. It stands for "energy efficient," and means it has a TDP of 95W. That's down from the 125W and 220W TDPs used by other AMD FX chips, but it's still 11W more than Intel's Core i5 parts require. That's because it still relies on the 32nm Piledriver architecture, rather than the 28nm Steamroller cores found in AMD's APUs.

The power reduction also means the spec has taken a hit. Its stock clock of 3.3GHz can't compare with full-fat FX, most of which start at 4GHz. The low-power FX closes the gap in Turbo mode, where its top figure of 4.3GHz matches the full-fat FX-8370. That's a decent figure, but the FX-8370E still uses the AM3+ socket, and relies on the same old chipsets. That's a problem, as the top-end 990FX part doesn't support USB 3 or PCI-Express 3.0, with third-party controllers needed to facilitate both now-common technologies.

But AMD's introduction of a low-power 8-thread chip still makes sense. It's the first time AMD has released a 95W, 8-thread Piledriver part. Its $194 price puts it a few bucks below the Core i5-4570, and $35 cheaper than the unlocked Core i5-4690K, which are both Hyper-Threaded quad-core CPUs with 22nm silicon.

AN INTEL-BEATER?

AMD says this chip can take on the Core i5, but our benchmarks suggest it can't. Its single-thread Cinebench score isn't as good as the latest Pentium, let alone a Core i5. It came close in the multithreaded test, but couldn't overtake. It didn't impress in gaming tests, either. A *Battlefield 4* average of 54fps is way behind a Core i5. In *Rome 2*, the FX chip averaged 61fps—close, but still behind. In *Metro: Last Light*, however, the AMD part averaged 60fps, which did best every Core i5 part.

This low-power chip is still unlocked for overclocking, despite its low-power branding, so we took the 200MHz base clock, multiplied it by 22.5 and upped the core voltage to 1.4V. The 4.5GHz core helped the FX chip catch the Core i5 in the Cinebench multithreaded test and the X264 video encoding benchmark, but its single-threaded performance still faltered.

AMD's latest chip sets out to prove a point, but this part merely confirms AMD's Piledriver architecture is too old. It's barely able to catch a Core i5, despite quite high power consumption. And then there's price. The Core i5-4570 easily has it beat.

–MIKE JENNINGS

BENCHMARKS

	AMD FX-8370E	AMD FX-8370E (4.5GHz)	INTEL CORE i5 4570
CPU Rendering Performance			
Cinebench R15	506	**651**	543
CPU Gaming Performance			
Battlefield 4 (min/avg fps)	45/54	45/55	**49/72**
Peak Platform Power			
100% CPU Load (Watts)	164	241	**115**

Best scores are bolded.

VERDICT **6**

AMD FX-8370E

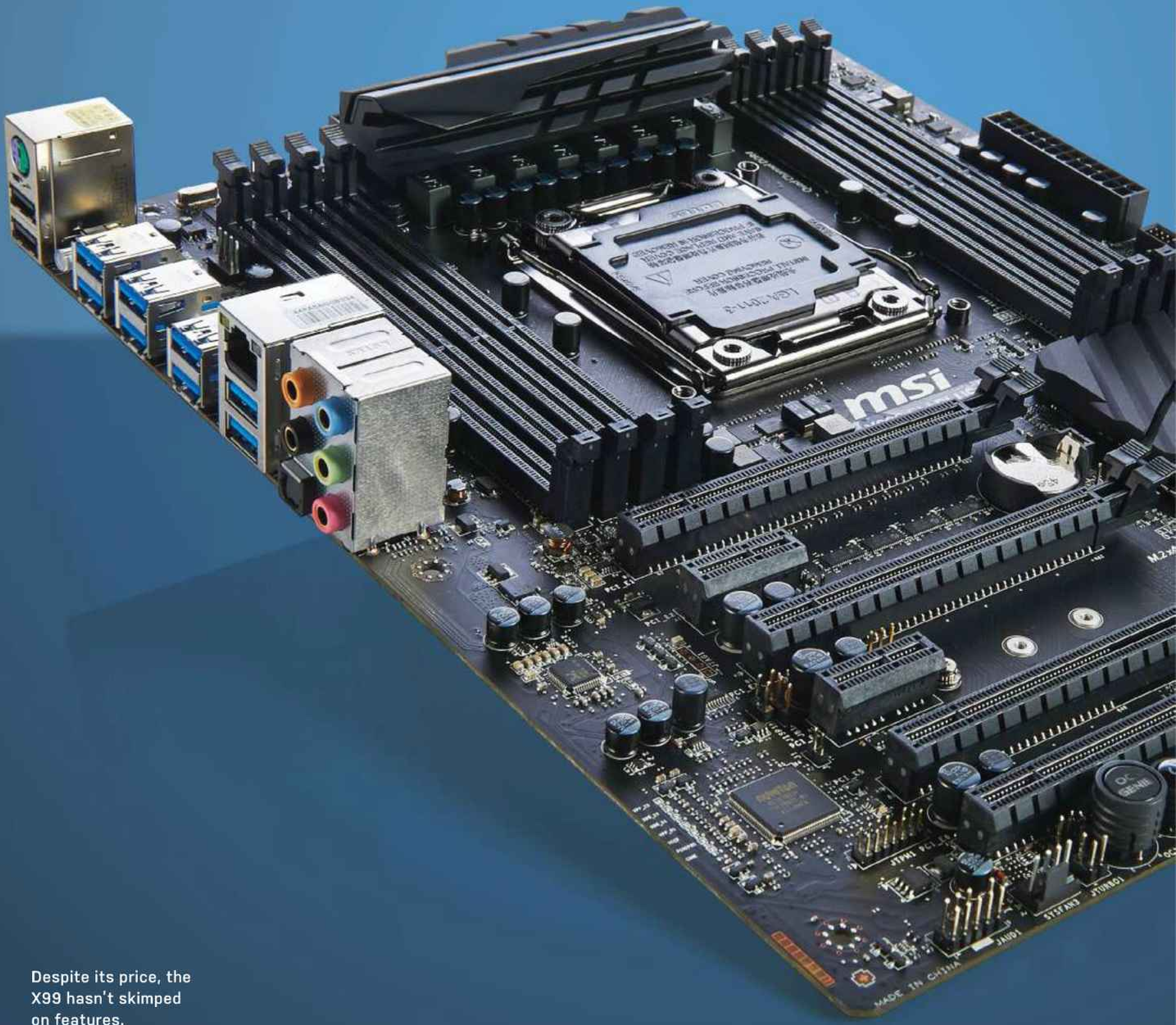
+ GODFATHER 2 Better than previous AMD parts.

– GODFATHER 3 Old architecture can't match Intel in performance or efficiency; no chipset support for USB 3 or PCIe 3.

$194, www.amd.com

MSI X99S SLI PLUS

Is this the budget X99 board we've been waiting for?


msi
LGA 2011-3
OC GENIE
MADE IN CHINA

Despite its price, the X99 hasn't skimped on features.

SPECIFICATIONS

Form Factor	ATX
Chipset	Intel X99
Socket	LGA2011-v3
Memory	Quad-channel DDR4
Storage	M.2; SATA Express; 8x SATA 6Gb/s
Extras	SLI; Crossfire

THIS IS IT. Pretty much the cheapest X99 motherboard you can currently buy. Of course, giving the nod to the absolute cheapest option in any price category would normally be asking for trouble. But this time, things could be different.

For starters, maximising value is critical when moving to Intel's new high-end X99 platform, the new LGA2011-v3 socket, and the Haswell-E processors that go with it. For the first time in living memory, you can actually make a value argument for upgrading from the best quad-core CPUs for the LGA1150 socket—for instance, from the Core i7-4790K to the cheapest of the new Haswell-E processors, the six-core Core i7-5820K. Price-wise, you're looking at just over $340 for the 4790K or just under $390 for the 5820K. Tempting, eh? Possibly not, however, if you have to add $100 to the 5820K for an X99 motherboard over an equivalent Z97 LGA1150 board. Plus there's the extra outlay for DDR4. Put it all together and it's obvious that Haswell-E makes most sense if you can minimize costs.

GAME ON

Enter the MSI X99S SLI PLUS. At a little under $230, it's not bargain basement, but it's not much more costly than a low-end Z97 mobo. What's more, the X99 chipset is a quality item with loads of features, regardless of what board it's plugged into.

First impressions of the X99S are reassuring. There's proper heft and thickness. It's a bona fide high-end motherboard in that regard. The core feature set is hardly cut-down, either. You get a full set of eight memory DIMM slots, for example, ensuring maximum flexibility. Ditto the presence of a full-length M.2 slot and a SATA Express connector. OK, we doubt many of us will make much use of the latter, but it's there and if SATA Express turns out to be more popular than it currently seems, you're covered. Similarly, there's support for both Nvidia's SLI and AMD's Crossfire multi-GPU platform. Again, only a small minority of gamers use these technologies, but it's nice to know they're there.

Elsewhere, there's an octet of USB 3.0 ports on the back panel, and hardware buttons for power, reset, clear CMOS, and MSI's OC Genie function. Finally, the PCB itself is all black with a nice matte finish. If you're looking for negatives, it's admittedly a little off the pace in terms of the benchmark numbers, but absolutely not to the extent you'd ever notice in the real world. And, critically, it does fine in the most important metric of all: overclocking. Audiophiles should also note that the sound circuitry is not isolated. In an ideal world, we'd have an LED debug screen to help us troubleshoot during the build process too, and the BIOS menu is a little confusing. But these are pretty minor concerns.

The X99S is pretty much exactly what we'd hoped for from an entry-level X99 board, and it becomes our weapon of choice for pairing with our new favorite CPU, the 5820K. Nice job, MSI. –**JEREMY LAIRD**

VERDICT 9 KICK ASS!

MSI X99S SLI PLUS

➕ **INTELLECTUAL** Great features and performance for affordable price; good partner for the 5820K.

➖ **INEFFECTUAL** Slightly underwhelming benchmark results; BIOS menu can be a bit confusing.

$225, www.msi.com

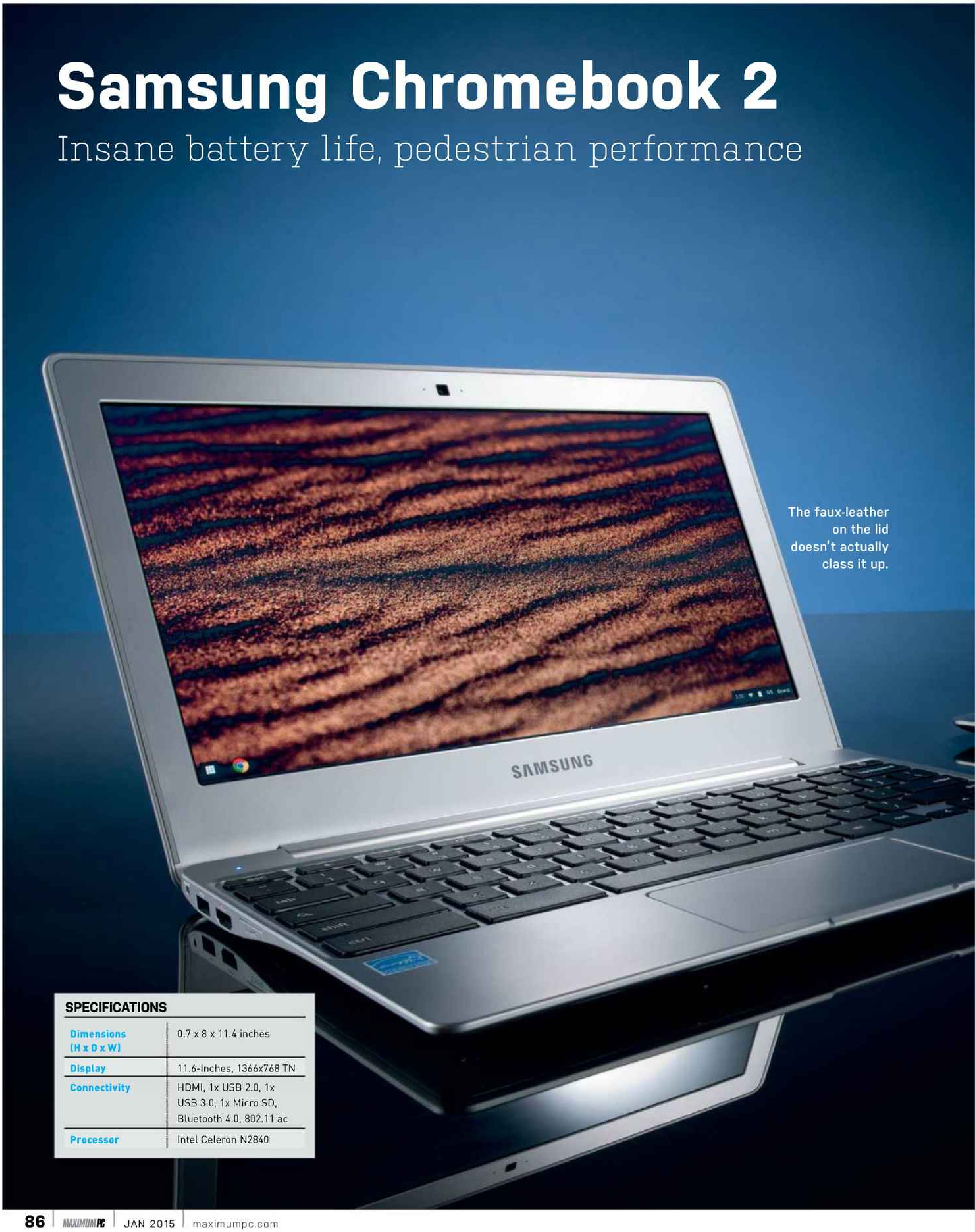
BENCHMARKS

	MSI X99S PLUS	MSI X99S GAMING 7	Asus X99 Deluxe
CPU Rendering Performance			
Cinebench R15	1,320	**1,387**	**1,387**
CPU Encoding Performance			
X264 v4.0 (fps)	78	**82**	**82**
DirectX 11 1080p Gaming Performance			
Battlefield 4 (min/avg fps)	**66**/92	59/**95**	58/93

Best scores are bolded.

Samsung Chromebook 2

Insane battery life, pedestrian performance



The faux-leather on the lid doesn't actually class it up.

SPECIFICATIONS

Dimensions (H x D x W)	0.7 x 8 x 11.4 inches
Display	11.6-inches, 1366x768 TN
Connectivity	HDMI, 1x USB 2.0, 1x USB 3.0, 1x Micro SD, Bluetooth 4.0, 802.11 ac
Processor	Intel Celeron N2840

IT MAY SURPRISE YOU TO KNOW, but we absolutely love writing about Chromebooks. Sure, none of us would trade our daily drivers in for one, but the category is vastly more interesting than a lot of others.

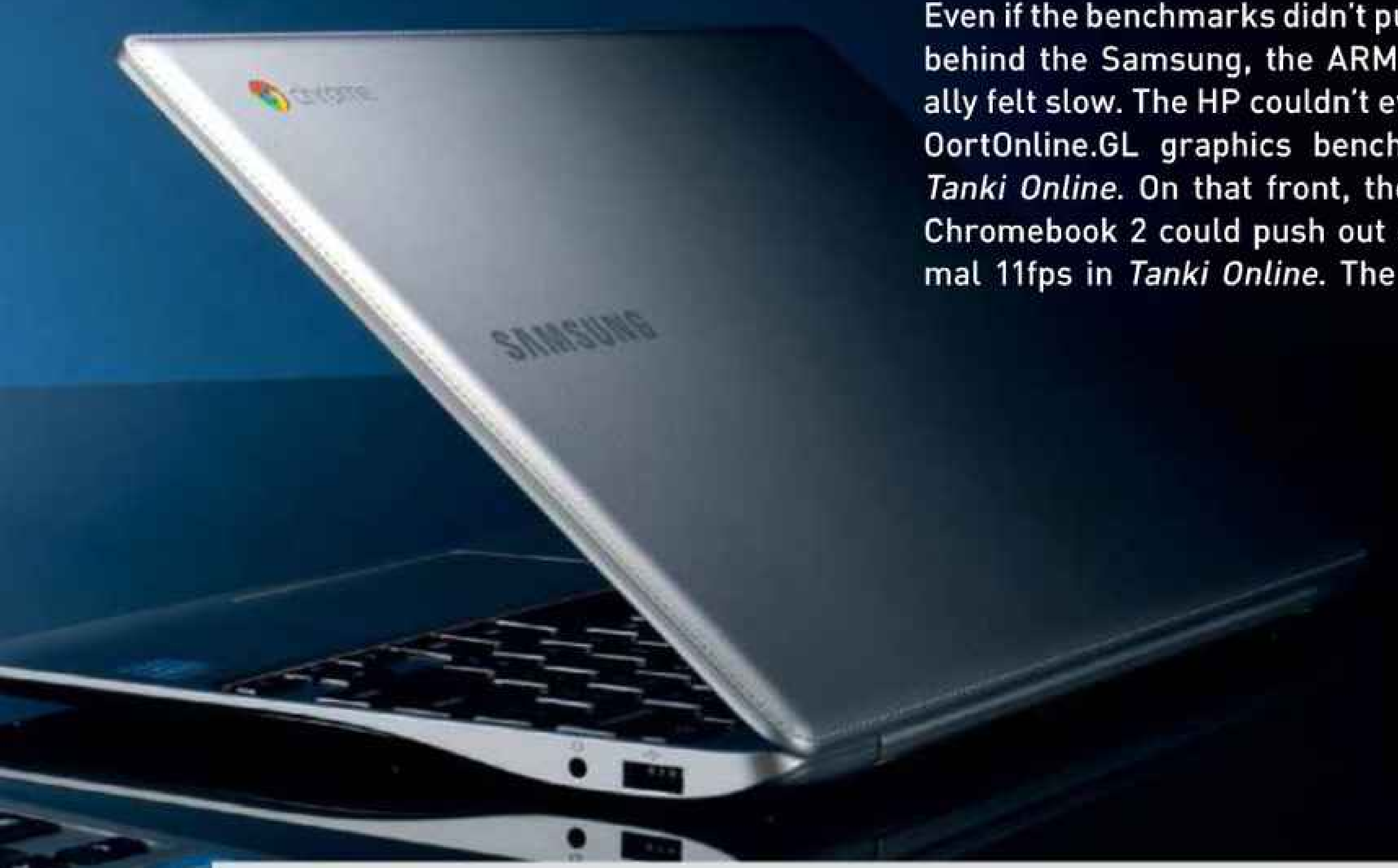
That's because most laptops get boring really fast. Once a new CPU is out, all of the older CPU models are flushed and there's very little difference between them. With Chromebooks, it's a smorgasbord of architectures. The new Samsung Chromebook 2 here, for example, packs a dual-core "Bay Trail" 2.18GHz Celeron N2840, which turbo boosts to 2.58GHz.

One thing we want to point out before it confuses the hell out of you is that this new Bay Trail–based Chromebook 2 is not to be mixed up with the eight-core Exynos 5–based Chromebook, which also happens to be named Chromebook 2. And yes, there are Celeron-based Chromebooks that use Haswell Celerons being sold alongside Chromebooks using Bay Trail–based Celeron Chromebooks, too. Got it? We don't.

Since we were curious as to how well the Bay Trail Celeron would do, we compared it to our old standby, an Acer C720 Chromebook using the Haswell-based 1.4GHz Celeron 2955U, and also the HP Chromebook 11, which uses a dual-core 1.7GHz Samsung Exynos 5250 ARM processor. The upshot: the new Bay Trail Celeron is capable, but it ain't no Haswell. It easily outperformed the HP Chromebook 11 but the results were close enough that we suspect a hotter ARM chip, such as Nvidia's Tegra K1, might give it a good run. To be fair to this little Celeron, it's fine for normal loads—we were able to load 20 web pages and scroll without the hellacious lag that ARM-based Chromebooks have given us in the past.

That's a real issue, too. Older ARM-based Chromebooks are not recommended unless you want to slow down your life. Even if the benchmarks didn't put it that far behind the Samsung, the ARM chip actually felt slow. The HP couldn't even run the OortOnline.GL graphics benchmark, nor *Tanki Online*. On that front, the Samsung Chromebook 2 could push out a sub-optimal 11fps in *Tanki Online*. The Acer C720 brought us to a playable 30fps, while a Haswell Core i3–based C720 hit 60fps.

The Chromebook 2's 11.6-inch TN panel is meh in off-axis, and colors are muted. Despite this, it's actually a technically better panel than the IPS in the HP Chromebook 11 in white saturation, black level, and compression banding. The average Joe will still pick the HP's IPS panel as being "better" side-by-side, though.



MARATHON MAN

The keyboard on the Samsung is OK and has a standard 19mm pitch width. The speakers were passable but were tinnier than the Acer C720 and not as loud. We also did some write testing to the unit's 16GB eMMC storage by copying a 3.7GB video to it via USB 3.0. Performance was not as pathetic as the HP Chromebook 11, but we do wish for a bit more heft, especially when Acer's C720 series of Chromebooks offer better performance at a better price.

The battery life is nothing to scoff at, though. Sure, it's maybe half the performance of the Haswell Celeron, but it's also half its wattage, too, at 7.5 watts for the Bay Trail Celeron chip. The Acer C720, which we consider pretty good at more than five hours of constant use, was eclipsed by the Samsung, which took us up beyond seven hours. Considering that's a constant repeating of an HTML5 benchmark, we're pretty sure normal googling and email will give you a full day's use.

In the end, what we have is a middle-of-the-pack Chromebook in features, on the lower end of the scale in performance, but stupendous battery life. On the street, the Chromebook 2 is $250. The older Acer C720 we compared it to with its 4GB of RAM would set you back $320. However, you can get that same C720 with half the RAM for $199. If we had to pick performance over battery life, the C720 is the go-to Chromebook, but there is something to be said about just (barely) good enough performance with insane battery life, too.
–GORDON MAH UNG

BENCHMARKS

	Samsung Chromebook 2	HP Chromebook 11	Acer C720-2800
CPU	2.18GHz-2.58GHz Celeron N2840	1.7GHz Samsung Exynos 5250	1.4GHz Celeron 2955U
RAM	2GB DDR3L/1600	2GB DDR3L/1066	4GB DDR3
SunSpider 1.02 (ms)	607.7	756.6	**358.3**
Google Octane V2	7,579	6,203	**11,638**
Peacekeeper	1,659	1,174	**3,062**
Wirple	449	337	**1,368**
Kraken 1.1	3,897.6	5,211.0	**2,500.4**
OortOnline.Gl	1,380	WNR	**3,258**
File Copy Across USB 3.0	122	255	**87**
Battery Run Down (min)	**434**	230	309
Weight (lb)	2.65	**2.30**	2.76

Best scores are bolded. All three Chromebooks were tested using the latest ChromeOS update 38.0.2125.110.

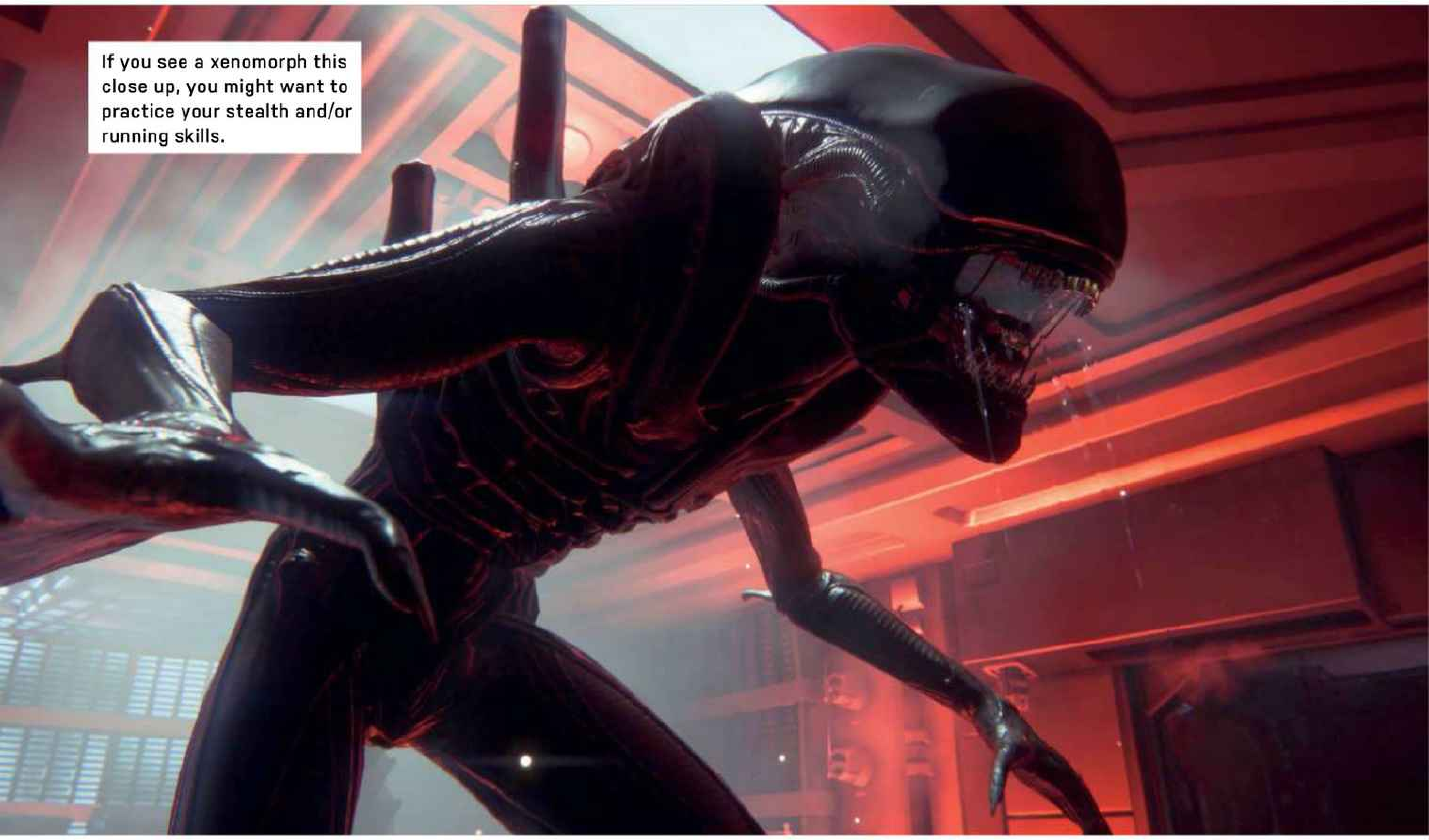
VERDICT
8

Samsung Chromebook 2

➕ **CELERY** Fine for even heavy browsing; truly stupendous battery life.

➖ **RUTABAGA** Lackluster graphics performance; should be cheaper.

$250, www.samsung.com



If you see a xenomorph this close up, you might want to practice your stealth and/or running skills.

Alien: Isolation

Could this finally be the *Alien* game that doesn't disappoint?

SET 15 YEARS AFTER THE ORIGINAL FILM, *Alien: Isolation* sees you playing as Amanda Ripley, daughter of Ellen, an engineer for megacorporation Weyland-Yutani. She's on a journey to the space station Sevastopol when she learns the flight recorder for her mother's lost ship, the *Nostromo*, is being held there. It's clear from the moment she gets to the abandoned space-city, however, that something is horribly wrong.

A labyrinthine warren of corridors, vents, and tunnels, Sevastopol is being decommissioned and is in a severe state of disrepair, with the claustrophobic confines of its twisting metal bowels being where most of the game is played. But while we've explored environments like this before, in games such as *System Shock* and *Dead Space*, it's the art design that sets *Isolation* apart. Resisting the urge to create a slick, contemporary vision of the future, developer Creative Assembly has instead looked to the production design of the film for inspiration. It built its world as Ridley Scott would have in 1979, using only technology from the period.

The chunky keyboards, phone receivers, distorted CRT monitors, and blinking colored lights should look dated, but it has quite the opposite effect. This is a tactile, practical, and convincing science-fiction world, with machines and environments that are functional and utilitarian, rather than overtly futuristic. You almost feel like you can reach out and touch it.

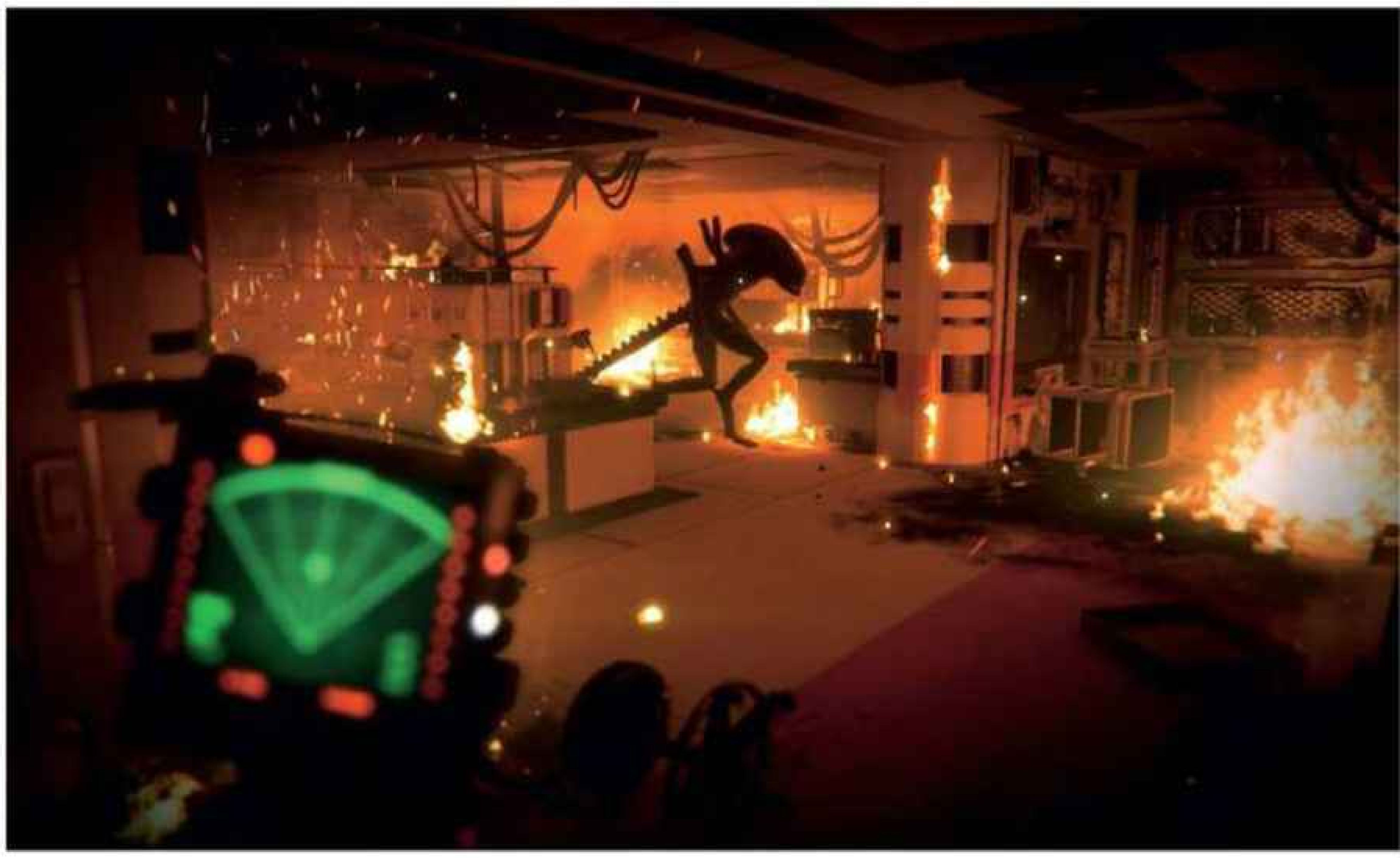
CREATURE DISCOMFORTS

But a sci-fi corridor isn't much without something horrifying to chase you down it. So it's a good thing that *Isolation* is the first game to make H. R. Giger's alien every bit as formidable and intimidating as it is in the films. In *Alien*, Ripley asks Ash how they can kill the creature that burst from Kane's chest aboard the *Nostromo*. He gravely replies: "You can't." This, unlike the dumb drones you blasted your way through in *Colonial Marines*, is also true of Sevastopol's alien. It's a merciless, unstoppable force.

You can shoot it, but it'll just get angry and pounce at you. You can burn it, but that'll only scare it away for a few seconds. *Isolation*'s magic lies in the fact you have to outsmart its single alien rather than kill it. This turns what could have easily been yet another FPS with xenomorphs into a thrilling, drawn-out game of cat-and-mouse with the scariest cat imaginable. It's a deft blend of stealth and survival horror that, thanks to dynamic AI and clever, systemic design, is much more than the sum of its parts.

You'll know when the alien is near. As you creep through the station, you hear it above and below you, behind the walls, under the floor. You're relatively safe when it's hidden away, but you never know what vent, crack, or hole in the ceiling it'll suddenly emerge

ABOVE You can also play as Ellen Ripley, reliving the desperate final moments on board the *Nostromo*, in the *Last Survivor* DLC.



ABOVE RIGHT What makes *Isolation* stand apart is that you have to outsmart a single alien, not kill an army of them.

from. It arrives with a beastly hiss—your cue to run or hide. Then you hear the pounding of its footsteps as it wanders the corridors, hunting for its prey—you.

The alien is an almost constant threat, but Sevastopol also has other dangers. Malfunctioning androids called Working Joes wander the station, brutally killing any humans they come across. Their rubbery, emotionless faces and glowing eyes are genuinely unnerving. Get too close and they'll grab you, draining your health until you manage to break free. You can kill them, but it takes a lot of resources, making stealth the best option. They're a lot slower than the alien, but every bit as deadly.

KEEP IT DOWN

Then there are other survivors. You'll run into them less often, and they're a lot easier to kill, but they usually work in groups. They won't shoot on sight, and will give you a few seconds to back away if you wander into their territory, but it doesn't take much to send them into a frenzy of gunfire. Luckily, if they shoot at you, the noise will attract the alien and it'll kill them all. This is often the best way to get past human enemies: provoke them, then wait for the bloodbath.

Whichever enemy you're up against, sneaking is always the key to survival. You'll pick up a shotgun, a revolver, and a few other weapons as you progress through the station, but they're more of a curse than a blessing. For one, they're only really effective against humans. It takes a dozen headshots with the revolver to drop a Working Joe, and the alien is essentially bulletproof.

Any noise, from sprinting to knocking a chair over, will give your position away, so you'll spend much of the game creeping between objectives. This might sound dull, but the presence of the alien makes almost every moment exhilaratingly tense. After getting through one long section, our palms were sweating and we had to lie down. This is not a game to play just before bed.

The audio design is just as accomplished, using many effects from the movie, such as the metal scrape of vent covers opening, and the electronic chatter of the computers. But it's also a vital part of the stealth, and we advise playing with a good pair of headphones or surround sound—you can track the movement of the alien by sound alone, gauging its distance and position by its footsteps.

As Ripley Junior is an engineer, it's a good excuse to add a crafting system. Raw materials litter your surroundings and can be taped together to create useful items. As well as the noisemakers and Molotovs, you can make smoke bombs, EMP mines for disabling synthetics, and blinding flashbangs. The effects of these are temporary, but if you stun an android with a mine, you can whack it over the head with your wrench for an easy kill. Flares can be tossed to lure the alien, and if you toast it with your flamethrower, it'll scream and run away. But not for long.

Combining items and weapons in interesting ways, and playing with the enemy AI, gives the game a lot of unexpected depth and kept it interesting for the entirety of the 25 hours it took us to finish it. Yeah, 25 hours. This is a long game, but it never outstays its welcome. This is down to the pacing, which is pretty much perfect.

But now for the weak link. The story is disappointing, retelling a familiar yarn we've already heard countless times in the *Alien* universe. The good thing about this is that it lets you relive classic *Alien* moments and experience them from a more visceral perspective. The bad is that it feels derivative, never taking the chance to make its own mark on the mythology.

They've done an excellent job with the PC version. On ultra settings at 1080p, the game runs at a solid 60 frames on the fairly decent 2GB GPU we used, and loiters around 30-40fps on a relatively ancient 1GB card we also gave a go. The geometry of the levels is pretty simple when you look at it closely, especially with all that lo-fi retro tech, but it's the beautiful volumetric lighting and smoke, detailed levels filled with clutter, and bold visual design that give it its fidelity.

It's ridiculous that it's taken so long to finally create an authentic *Alien* game, but *Total War* developer Creative Assembly has managed it. It's succeeded where countless others have failed by treating Giger's monster with the reverence it deserves—as something to be feared and respected, not faced head-on with a pulse rifle. *Isolation* is a taut and electrifying horror game that perfectly captures the essence of the legendary film. We just wish they'd been a little braver with the story. –ANDY KELLY

VERDICT
9
KICK ASS!

Alien: Isolation

+ GREAT SCOTT Fantastic design; great combo of stealth and survival horror; fairly undemanding tech specs.

− OR NOT Story is too derivative.

$50, www.alienisolation.com ESRB: M

The game chooses a constantly eerie atmosphere over a spook-reel of forced jump-scares.

The Vanishing of Ethan Carter

The great outdoors has never looked so good, but something dark lurks beneath

PAUL PROSPERO'S JOB DESCRIPTION, supernatural detective, isn't just awesome, it carries a double meaning. Yes, he's an investigator of the otherworldly—visiting Red Creek Valley to solve the mystery of a young boy's disappearance and several gruesome murders—but he also has magical powers himself. He's able to see the past as a series of ghostly images, like a spectral highlight reel. By examining clues, reconstructing crime scenes, and replaying events, Paul can piece together the events leading up to Ethan Carter's disappearance… when he's not gawking at one of the prettiest games ever made.

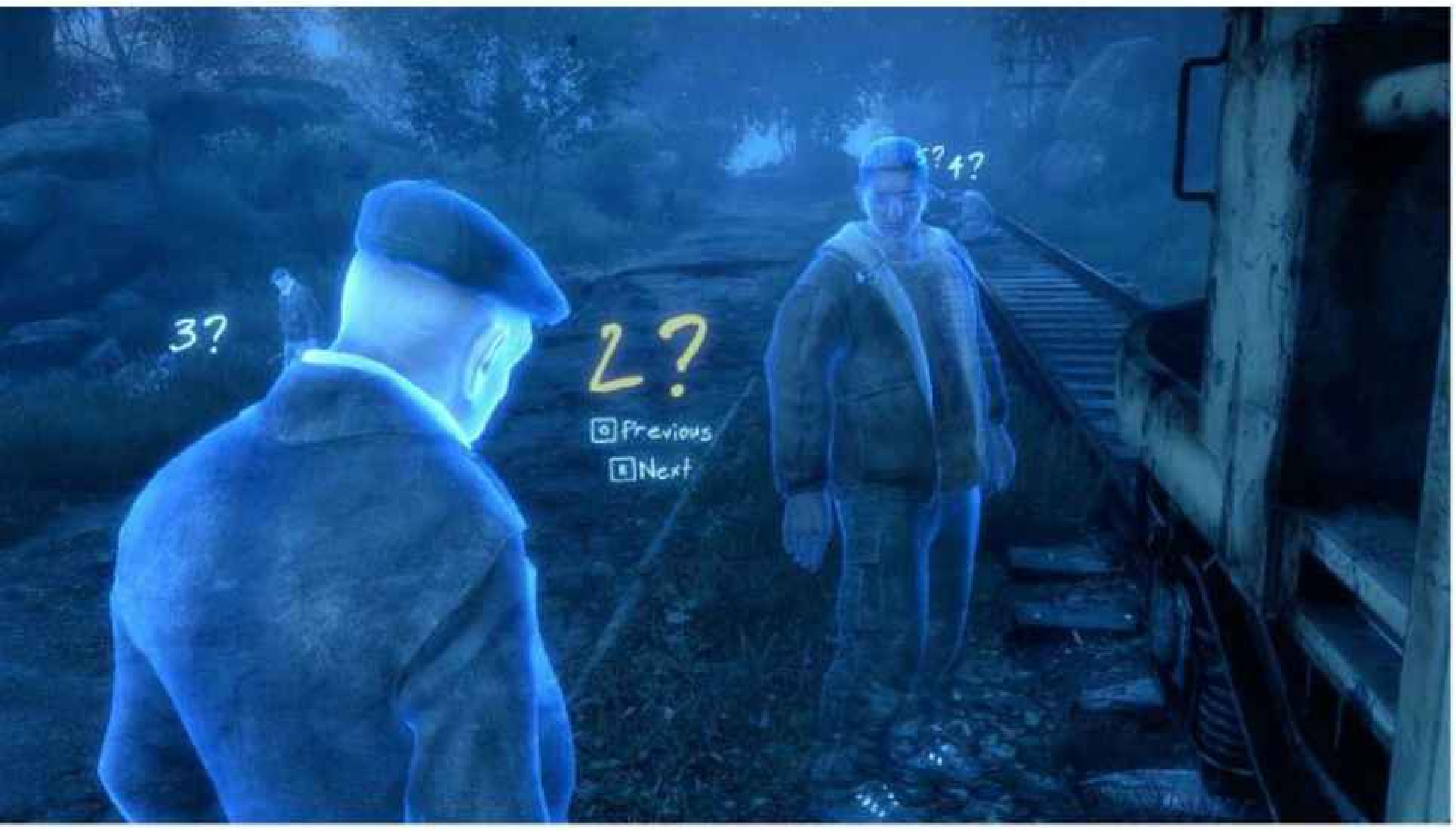
"This game is a narrative experience that does not hold your hand." That's the first thing *The Vanishing of Ethan Carter* tells you. It feels like a boast, but it's sort of true. There's only a brief introduction: Ethan Carter wrote a letter to Paul, asking for his help. Beyond that, the game trusts you to discover how it works on your own. It doesn't fabricate reasons for you to sprint or crouch in a tutorial. There are no quest arrows, and if you're not careful you can walk past entire story elements. You can even solve the game's mysteries out of sequence. It's cool with that.

The Vanishing of Ethan Carter doesn't trust you entirely, though. It will draw your attention to the crankshaft on the nose of a stalled train, at which point the word "Crank?" will appear, duplicating itself, swirling in front of your eyes, flooding across the screen with all the subtlety of a pop-up ad. "Crank? Crank? Crank?" Hold on. We're getting a psychic message here… We think we need to find… a crank? And then crank it? Glad this game doesn't hold our hand.

If you reach the end without finding everything, there's a handy map painted on a wall with, well, a bunch of quest arrows, directing you to the puzzles you missed. The point is, while *The Vanishing of Ethan Carter* doesn't guide you in the usual sense, it still tries awfully hard to make sure you don't miss anything. Thankfully, doing so is well worth your time.

SPECTRE INSPECTOR

Paul's skills don't end with floating tooltips. After reconstructing a murder scene by finding and replacing a few items, he can conjure up the events that led to the bloody tableau. First, he sees them as a series of images: holograms of ghosts, still and si-



ABOVE You have to number the ghostly players in order to replay each grisly crime.

ABOVE RIGHT The gorgeous scenery is remiscent of 2012's experimental *Dear Esther*.

lent, in various phases of the murder. Once you've found them all, you need to put them in chronological order. Did the couple peer into the crypt before the death, or after?

Once you've assigned numbers to the ghosts, you can watch the scene unfold in a spectral replay, provided you've ordered the scene correctly. If not, the scene will play until it reaches your mistake before dissipating, leaving you to make corrections and run the spook-reel again. It's an enjoyable activity, rather like directing a movie without having seen the script.

There are a couple of other types of puzzles, too. One requires a fair bit of memorization—something we're rotten at (we had to resort to taking screenshots and referring to them for comparison). Another involves matching symbols to unlock a gate. And, in true videogame tradition, there's a big water valve to turn. The puzzles are familiar, but very well-made and satisfying to solve.

The Vanishing isn't really scary. It's eerie, certainly, and spooky and unsettling. But there's only really one genuine, board-certified jump-scare—it's cheap, sure, silly, yes, but still well done. And yet despite that, the general sense of dread and loneliness did make us jump a number of other times. The tension comes not from trying to scare you, but from making you think you might be scared at any moment. That's the best kind of tension, and it's entirely successful.

It's also gorgeous. The lighting, the textures, and the attention paid to the foliage and landscape meant we wound up stopping every couple of minutes just to look around in admiration. Peering over the edge of the massive dam (and peering back up at it, later, from below), gazing at the sunbeams filtering through the trees, admiring the beautiful decay of abandoned buildings, staring across a bridge, crossing it, and then turning back to stare again. We don't care if there are bloody corpses all over the place. We'd live in Red Creek Valley in a second, and possibly, only for a second. On our rig—Intel i7 2.8GHz, 8GB RAM, Nvidia GeForce 660 Ti—it ran remarkably smoothly on maximum settings for such a fine looking game.

The world is also extremely large, and while this isn't a complaint, it's not exactly stuffed with activities. There are several long stretches of trail, perfectly enjoyable to walk along, but with absolutely nothing going on. Some will enjoy it, feeling a bit of a *Dear Esther* vibe. Others will wish there was a bit more to actually do.

QUIET TIME

When it comes to the story, developer The Astronauts has exercised remarkable restraint. This is the first game in a long time where we didn't want to skip anything being said, mainly because there's not much of it. Paul's long nature walks offer ample opportunity for him to spew his thoughts, but while he does occasionally murmur some vague filler, he's always brief about it. Written clues are generally only a paragraph or two, and even the ghostly movies are quick and concise. *Ethan Carter* makes the most of its few words, and gives you plenty of time to think about them.

With so much going for it, it's a shame *The Vanishing* shoots itself in the foot by not letting you save your game manually. We were playing late at night for full creepiness, and decided to call it quits and get some sleep. A warning popped up: quitting would lose the progress we'd made since our last autosave. When was our last autosave? No idea. That's the problem with minimal on-screen elements. We never saw the autosave indicator. Fearing we might lose the past half-hour of work, during which we'd found many clues but hadn't solved a puzzle, we trudged on, trying to progress enough to force the game to save again. Twenty minutes later, we solved another puzzle at the other end of the map, but were annoyed at having to rush it just to get to bed. What's more, when reloading the game the next morning, we'd been returned to the middle of the map, leaving us to wonder if the distant puzzle we'd solved the night before had been saved after all. It had, but we only found out after making another long trek back there.

That annoyance—and it wasn't minor—was about the only thing we didn't enjoy about *The Vanishing of Ethan Carter*. Visually, it's spectacular. It's tense and the mysteries are enjoyable to solve even when they're not that hard. The voice acting is decent, and while we don't think the story paid off in spectacular fashion, we found it intriguing, satisfying, and most importantly, wonderfully restrained. –CHRIS LIVINGSTONE

VERDICT
8

The Vanishing of Ethan Carter

+ GET CARTER (CAINE) A tense stroll through a gorgeous world; fun supernatural detective work with satisfying puzzles; efficient script.

− GET CARTER (STALLONE) Lack of manual save is annoying; there's perhaps too little going on for some gamers.

$24, www.ethancartergame.com ESRB: RP

LAB NOTES

JIMMY THANG **ONLINE MANAGING EDITOR**

The Hoverboard Is Finally Here!

And it's 1.21 gigawatts of cool

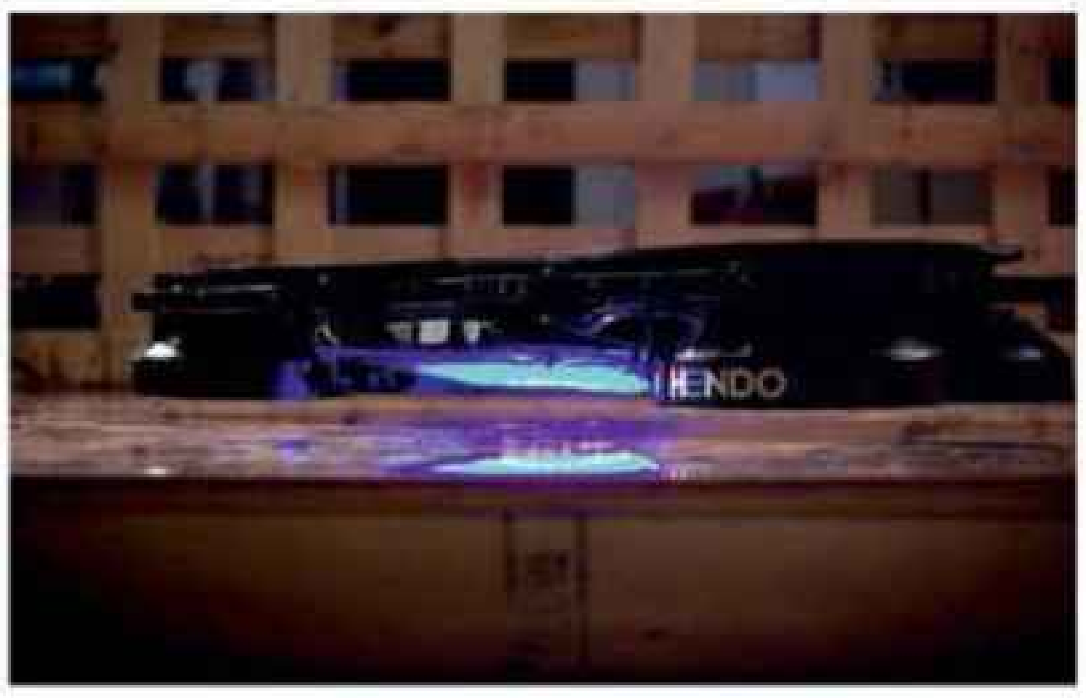
EVER SINCE I SAW *BACK TO THE FUTURE PART II* in 1989, I've had dreams of riding a hoverboard. But 25 hoverboard-less years later, I'd lost all hope of ever getting my feet on one. Until now. The hoverboard is here, and I've ridden it.

Created by California-based Arx Pax, the Hendo Hover uses a magnetic field architecture to transmit electromagnetic energy, one downside being it needs a metal surface to hover. As someone who skates and enjoys digging his wheels into the asphalt, I'll admit the hoverboard is much harder to control, since there are no wheels that grip anything. The board floats almost an inch off the floor, and trying to turn generally leads to you falling off. The engines are also surprisingly loud.

In the grand scheme of things, however, the Hendo hoverboard is really just a proof of concept for a much more ambitious endeavor. The real deal is what the technology can offer to the transportation sector, particularly trains. Arx Pax tells us that unlike the Maglev trains in Japan and Germany, its technology is much cheaper and much more maneuverable. So maneuverable that vehicles should be able to turn on a dime.

In addition to transportation, Arx Pax sees its hover engines being used to one day levitate buildings. The company asserts this could be used to protect structures in areas that are prone to earthquakes.

It remains to be seen whether any of this will end up panning out as intended, but the company will soon be selling a white box developer kit with four hover engines that users can experiment with, for $200. If all else fails, hopefully we get some hover parks out of this.



The board hovers roughly an inch off the ground, as long as the surface is metal.

GORDON MAH UNG

Editor-in-Chief

I've now tested Chromebooks running Haswell, Sandy Bridge, Bay Trail, ARM, and Atom CPUs. That has me scratching my head, wondering where the hell the AMD-based Chromebooks are. An APU seems like the perfect platform for Chromebooks, as they're just fast enough, and they're definitely cheap enough, to power the hot Chromebooks. I have no answer for this, but it's long overdue and, frankly, wouldn't be a bad thing for AMD's bottom line.

TOM MCNAMARA

Technical Editor

I feel like we've been awash in mechanical keyboards lately. Not that I'm complaining. Corsair, Razer, and Cooler Master continue to churn them out at a high rate, experimenting with backlighting and even getting into exotic key switches like Topre. We also got a Logitech G910 with custom switches called "Romer-G." Razer's doing custom switches, too. I like Cherry MX keys, but variety is also good for the market. I'm still not sure how much utility we're actually getting from RGB backlighting, but there's an inescapable cool factor. I've even started seeing it in mice.

First Look: Nimble VR

Control virtual reality with your hands

THE OCULUS RIFT HEADSET may allow you to peer inside a virtual reality, but no device has effectively let us control VR. Nimble Sense hopes to change that with its Nimble VR depth-sensing camera. The device got going on Kickstarter and easily smashed its $62,500 goal. Roughly the size of a pack of gum, you'll be able to mount the Nimble VR to the top of your Oculus Rift. The device will be able to track your hand movements and will allow you to pull, push, and pick up items in VR with your very own fingertips.

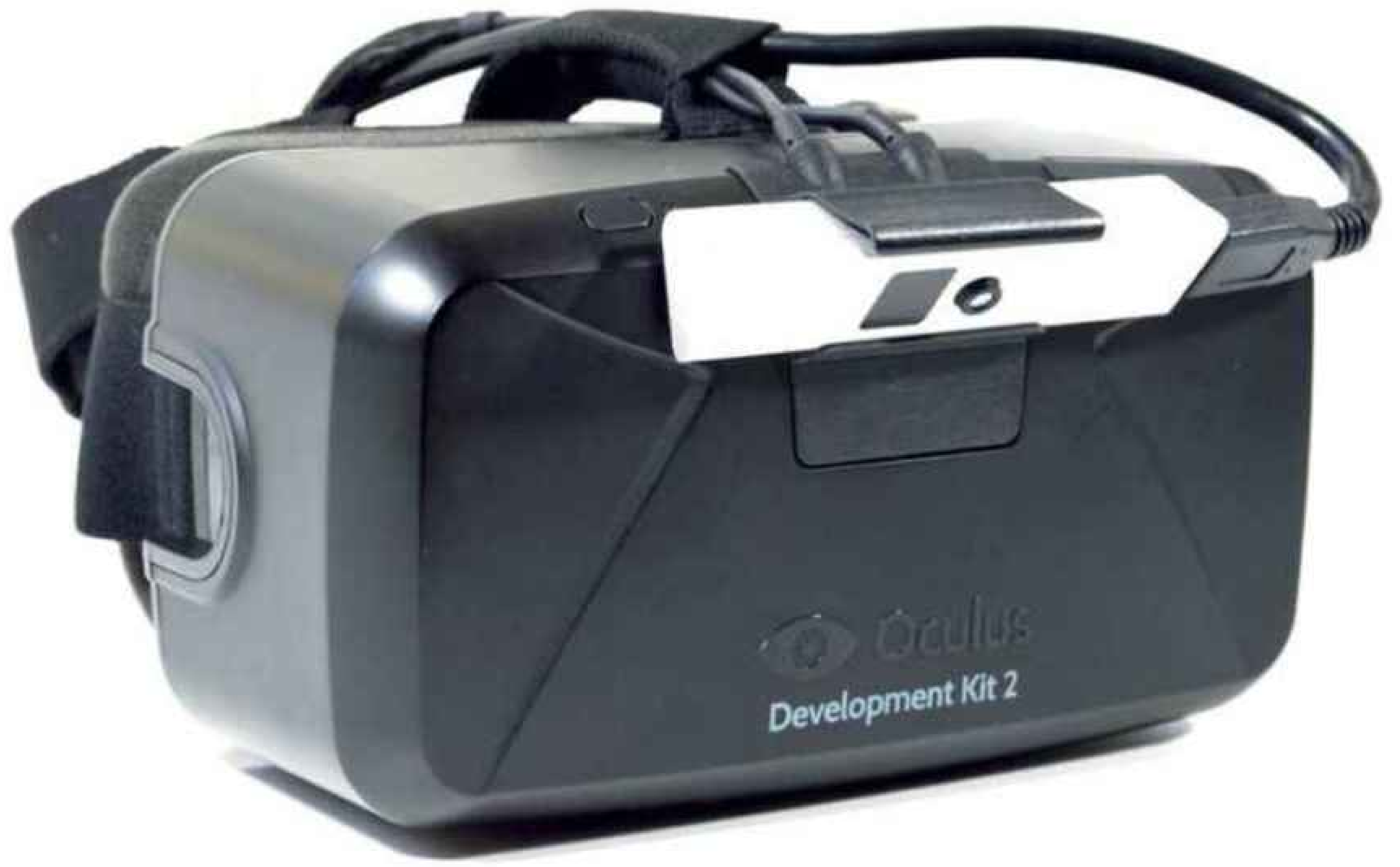
The camera works by identifying the joints of our hands. It then maps out our fingers onto a three-dimensional skeletal model via a 3D point cloud that has a depth-sensing range of 10-70cm, which Nimble says is the natural range of our arms. In addition, the camera has a 110 degree field of view, which is considerably wider than the Oculus Rift DK2's 90.

We got a chance to try out Nimble VR ourselves, and while it was still an early prototype with some slight lag, despite being a tethered device, we could definitely see glimpses of its potential. One demo we tried had us picking up virtual dice on a table and then dropping them into a cup. We could then pick up the cup and turn it upside down to drop the dice back onto the table. It worked surprisingly well and felt pretty immersive. Another demo we tried gave us super powers, the first of which allowed us to blast lighting beams out of our hands at opponents. To do this our hands needed to be wide open, kind of like Iron Man. Another special ability allowed us to turn our palms upward to levitate foes, and from there we could force-push them away. The final demo we tried allowed us to use *Minority Report*–style swiping gestures to play and pause a movie, alluding to the notion that the Nimble VR could be used for more than just videogames. On that note, Nimble Sense believes the medical world could also benefit greatly from these controls. Imagine a doctor operating on a patient from halfway around the world, for instance.

While the controls aren't so precise that they'll allow you to perform open heart surgery just yet, we did witness a demo where a rep showed himself cutting and hot-wiring some blue and red wires to hack open an electric door with only his (virtual) fingers.

Right now, we're in the Wild West when it comes to finding the best control method for VR. Without a clear frontrunner, VR will continue to be a scattered and fragmented platform. Ideally, a great solution will come along and form a standard that would allow all VR developers to hop on board. Nimble Sense is trying to be proactive about this situation by releasing all of its demos as open source, and will also provide developers with an SDK for its Nimble VR so that they can experiment with the tools themselves.

You'll be able to try the Nimble VR yourself when it begins shipping next June. **–JT**



Nimble Sense will include an Oculus Rift mount for the camera.

GEEK TESTED & APPROVED

Birksun Connect Solar Messenger

The bag weighs less than three pounds.

IF YOU USE AS MANY MOBILE DEVICES as we do, you might experience some anxiety when your battery is running low and you're nowhere near an electrical outlet. Most road warriors carry around portable batteries, but then that's another thing to keep charged. Wouldn't it be nice if you could get your juice without needing to plug anything into a wall? That's where solar charging bags and backpacks come in.

Birksun's Connect Solar Messenger bag has an array of solar panels on one side, and you can legitimately recharge a phone in a few hours. They also sell a battery that plugs into the solar converter inside the bag, so you can charge that via sunlight, as well as directly charging a device. We didn't quite get the advertised 4.4 watts of output, but it depends a lot on time of day, angle of the sun on the solar panel, and weather patterns. On the bright side (no pun intended), connecting to the solar panel is easy, since the converter has a standard USB port on it. The bag itself also has a premium feel, with a plush fleece interior (in either vibrant red or a more subdued gray) that can hold a laptop up to 15 inches in size. The softness of the material also reduces the chance of scratching your shiny mobile gadgets. The $150 asking price is a relatively high amount of money to spend on a messenger bag, but solar charging might be worth it to you. **–TM**

$150, www.birksun.com

LETTERS

WE TACKLE TOUGH READER QUESTIONS ON...

> Quality Cases
> Unsightly Cables
> Beyond HD

Kudos to Corsair

I recently upgraded my PC and needed a new case to hold all my new parts. I went with the Corsair C70 case you recommended in "Blueprints", and it's an amazing case to work with. I went with the green case for aesthetics only (it feels like an old ammo can) and enjoyed, for the first time in a long time, building my new machine. Everything was easy to work with, remove, or attach. More room inside is hard to imagine. Are there better cases out there? Sure, but the price was right and I've never been happier. Thank you, *Maximum PC*!

—Steve

EDITOR-IN-CHIEF GORDON MAH UNG RESPONDS: Glad to help you, Steve. It's always an eye-opener to build in a modern case if you haven't been hands-on for a few years. Today's cases put so much more thought into cable routing, cutouts for liquid cooling, backplates, and placement of storage devices that it's actually a joy to build a PC today. The C70 is a great case; I have the same case for one of my rigs at home (in olive drab, as well). Now what we need is one in flat dark earth.

Add 'Em to the List!

Reading "The List: 7 Games We Want Remastered" (Dec 2014) made me feel old. Not because of the games listed, but because the games I wanted to see on the list are (I guess) *too* old. I dream of playing remastered versions of *Strike Eagle III*, *Interstate '76*, *Redneck Rampage*, and *X-Wing vs. TIE Fighter*. Ah, to be young again.

—John W. Cranford Jr.

The Cable Guy

I was curious to know if you will be having any articles on cable management in an upcoming issue. I would like to make my case look like one from one of the boutique PC makers, but no matter how hard I try, I can't get my cabling that neat. It would also be great to have a computer desk review. I drooled over the Dream Machine desk but I will never be able to touch an exotic desk like that. Thanks for the many years of *Maximum PC*. **—Erik**

EDITOR-IN-CHIEF GORDON MAH UNG RESPONDS: We're probably overdue a story on cable management, but for a lot of people, that's like a story on properly flossing your teeth. We all know it's a good idea but we don't always do it. As much as we hear the, "I can build it just as well as that boutique system for one-third the cost," we forget that sometimes its nice to just pay someone to do it right. One of the key lessons for cable management is to plan out how you're going to route them first. Oftentimes, I'll build into a box and then realize I should have run a cable behind the motherboard plane or under the GPUs. Laziness then sets in and I just say, "I'll do that tomorrow, right after I clean out the garage."

Boutique vendors also get the benefit of buying cables from a PSU vendor cut to the length they need. Most of the mess in a system is dealing with cable slack, and just how the heck to hide the extra eight inches of cable you don't need. Fortunately, new cases that are precut for wiring and with ample space to route cables behind the board make achieving cable tidness pretty easy if you're really committed to it. As far as reviewing desks, we'd love to, but the logistics of getting gigantic desks in for review make it a little impractical at the moment.

4K Alternatives

I read your article on 4K monitors in December's issue. I liked how you demonstrated that you get what you pay for with the various monitors you covered. You said the best one for gaming was the Asus PB287Q, but that it still has problems. And you reiterated several times the need for dual GPUs to run any AAA game with playable frame rates. Even the tests run with the Nvidia powerhouse GeForce GTX 780 Ti didn't get playable frame rates with it playing AAA games.

I have a system with a Core i7-4930k and a GeForce GTX 780 Ti and am looking to upgrade my monitor to better than HD. So, if 4K won't work good on a system with a single GeForce GTX 780 Ti, should I buy a 2560x1600 or 2560x1440 monitor? I'd appreciate an article that compares these resolution monitors. My brother bought a no-name Korean 2560x1440 model that runs great, but I've read their LED screens are hit-or-miss.

—Khalil

ONLINE MANAGING EDITOR JIMMY THANG RESPONDS: If you plan to upgrade to a 4K monitor with a 780 Ti, you may want to consider getting another one for SLI, as we can't emphasize how taxing running 4K games is. You could, of course, turn down the settings to get more

↘ submit your questions to: comments@maximumpc.com playable frame rates on a single 780 Ti, but who wants to do that? Another thing to consider is that there's nothing wrong with gaming on a 2560x1600 monitor. In fact, we recommend it at this point for someone looking for something a little sharper than 1080p. Plus, they're generally much cheaper and don't have the annoying scaling issues that 4K monitors are experiencing on Windows right now.

In regard to the Korean monitors, we've heard some good anecdotal stories from friends who have purchased them, but know that your mileage may vary, and that you could end up receiving a display with a dead pixel or two.

> I WENT WITH THE CASE YOU RECOMMENDED. IT'S AMAZING. EVERYTHING WAS EASY. I'VE NEVER BEEN HAPPIER!

Straight Talk

I'm always hearing about which processors and GPUs work best together because they dont bottleneck each other severely. How do you determine this? The most common answer seems to be based on price. To me this seems a pretty shaky method for making such a decision. Just because the CPU vendor marked down a chip doesn't change its performance, and the same goes for the GPU. Is it based off of the amount of FLOPs that each are capable of, or is there another metric that I should be researching? Anything like a straight answer seems nonexistent on this subject, so I appreciate any wisdom you choose to share.

—**Chris**

TECHNICAL EDITOR TOM MCNAMARA RESPONDS: For games, it's customarily the CPU holding the GPU back. How much that happens depends on the game. Some use one or two CPU threads, while others need four or more. Clock speed also matters. Unfortunately, you have to take it on a case-by-case basis. But in our experience, an Intel Core i5 from a recent generation is a pretty safe bet. They're not inexpensive, but they'll last you a while.

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FORTY AWESOME 3D WALLPAPERS

If you've built yourself a kickass desktop, you should download an equally badass wallpaper to go with it. And if you ask us, 3D wallpapers can be pretty damned cool. That's why we've rounded up 40 of the coolest 3D wallpapers we could find. Want a background image of the Predator playing pool with a xenomorph? We've got it. Want some sweet 3D *Minecraft* backgrounds? We've got that covered, too. Check them out online here: http://bit.ly/mpc3d

The *Alien vs. Predator* sequel takes a surprising turn.

Facebook Polls

Will you upgrade to Windows 10?

This month's coverage of Microsoft's on-the-way OS prompted us to ask how excited *you* are about it. Here are a few of your responses.

Daniel J. Hill: Meh. I'll stick with 7 most likely until it's no longer supported.

Darrin W. Crenshaw: Only if it's truly free. I'm done buying operating systems and if this is the sign of a yearly thing, then I'll stick with 8.1 until Linux support ramps up with Steam.

Ralph Anderson: ROFL

Joel Cruse: If they ditch the whole app idea, then yes. Just give me good ol' programs.

Richard Rodney: Loved 8/8.1 despite the haters... going to get 10 as soon as it's available! Then Windows 12 next!

Ancelmo Valadez: I am using the beta version and I love it so far.

Thorsten Balthes: Still see those idiotic live tiles. No, thanks.

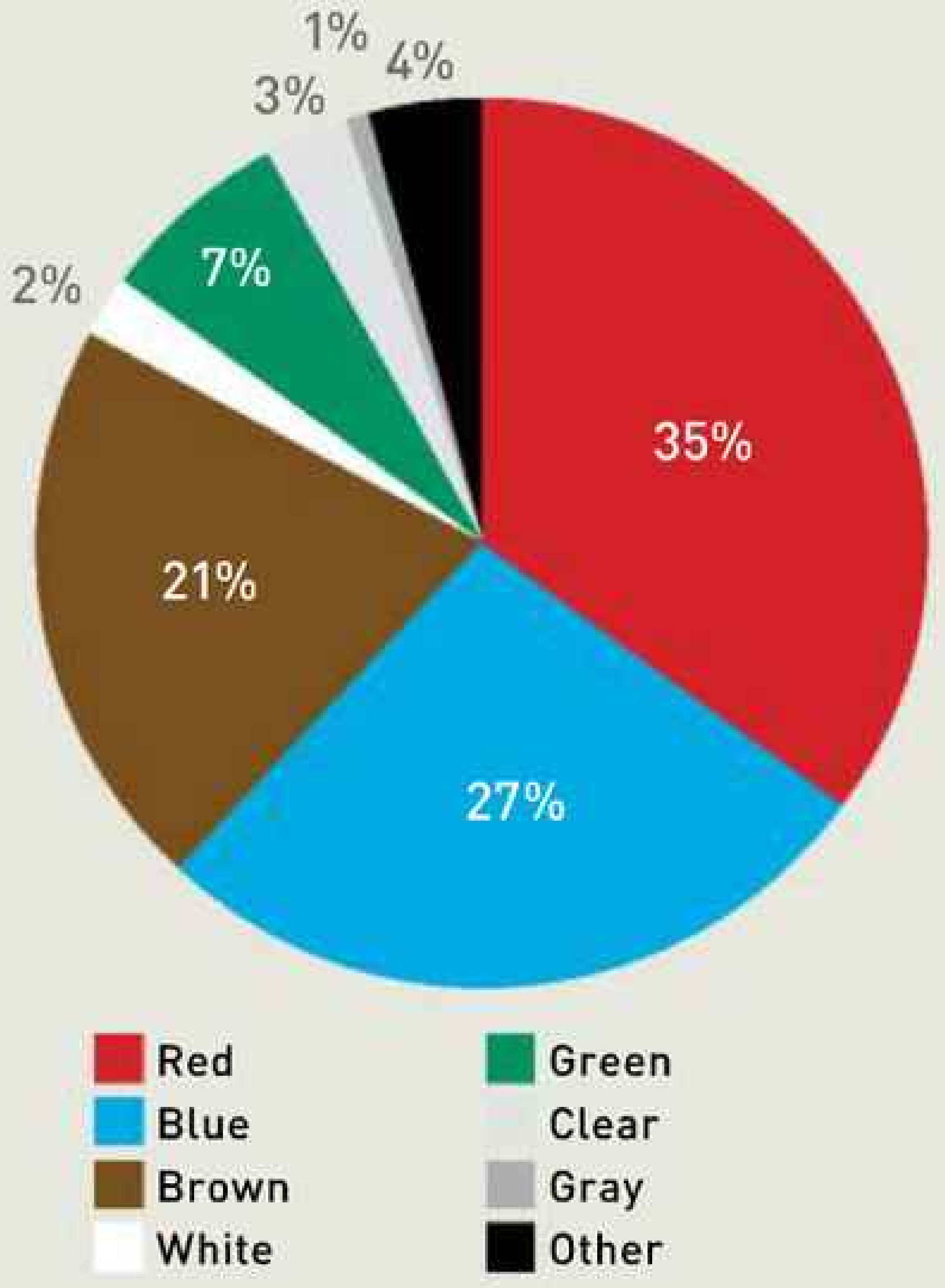
Chris Vucic: I've been using the Windows 10 developer preview, and it's pretty freaking sweet. I'll be an early adopter.

Shane Enns: Competent startbar = buy.

Rob Kingsboro: I'll be upgrading... to Linux Mint 19. After having upgraded to Mint 18.

Christopher Little: It's what 8 should have been in the first place. I'll be upgrading.

Which Cherry MX Switches Do You Prefer On Your Keyboard?



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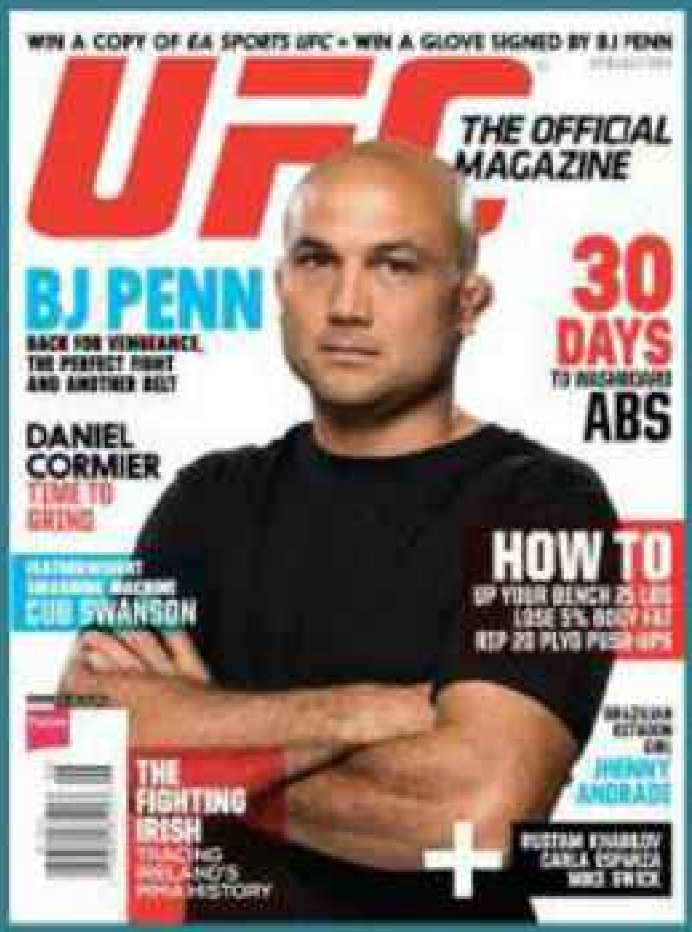
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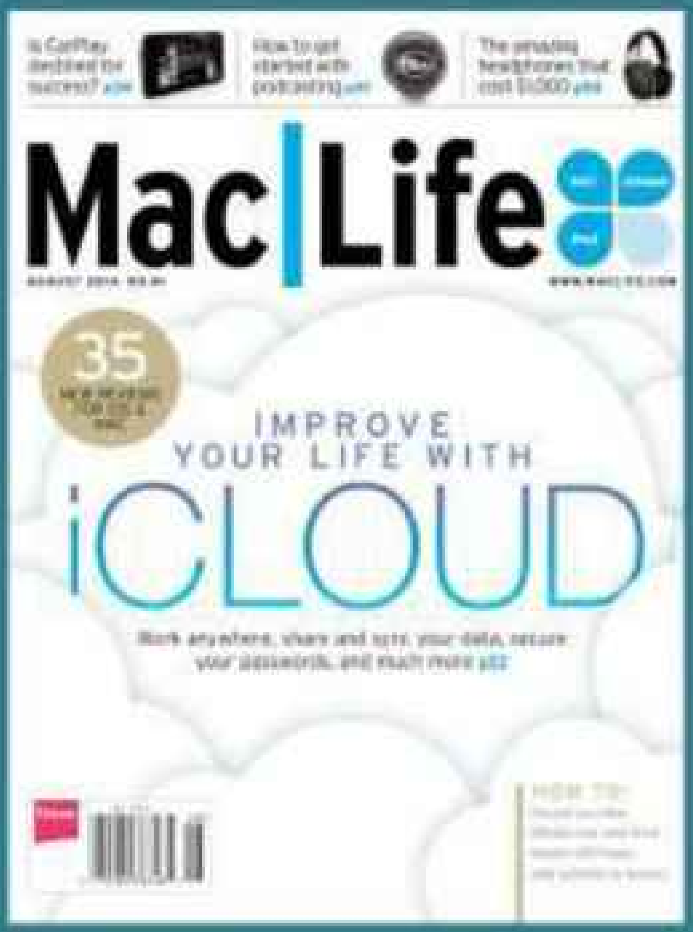
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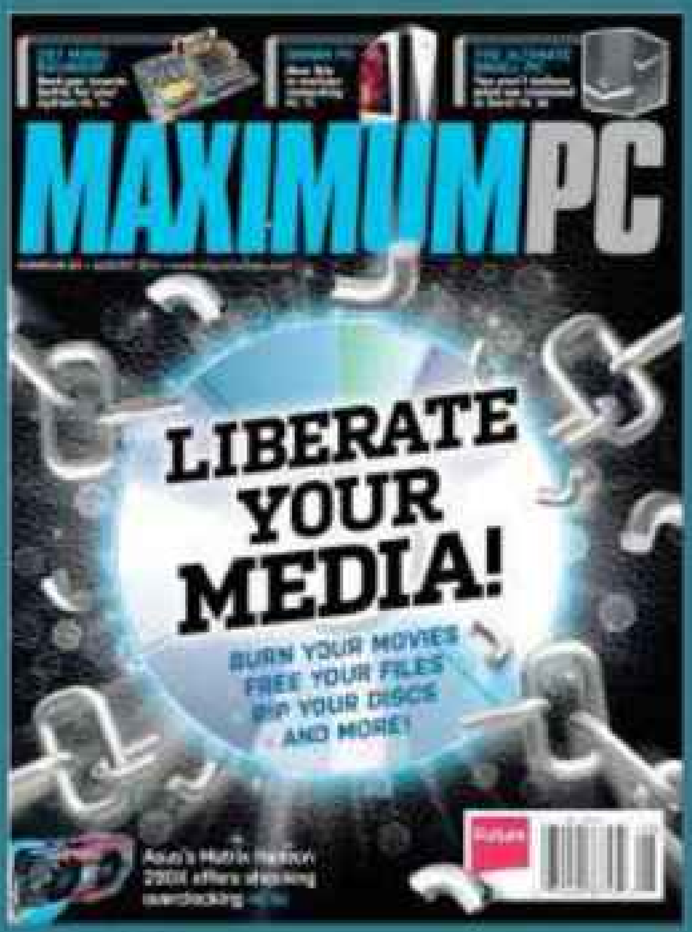
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THE BUILDS

BUDGET GAMER

INGREDIENTS

PART			PRICE
Case	NZXT Source 210 Elite		$50
PSU	Corsair CX500M 500W		$35
Mobo	Gigabyte GA-H97M-HD3		$83
CPU	Intel Core i3-4150		$120
GPU	Sapphire Radeon R9 280	**NEW**	$165
RAM	2x 4GB G.Skill Sniper Series 8GB (2x4GB) DDR3/1866		$74
SSD	128GB SanDisk Ultra Plus		$66
HDD	Seagate Barracuda 1TB		$60
OS	Windows 8.1 64-bit OEM		$100

Approximate Price: $753

IT APPEARS AMD has still not discontinued the Radeon R9 280, though the price has crept up slightly from $156 to $165 (after a $15 mail-in rebate), and the version from MSI we listed last month is no longer on sale. We've replaced it with a unit from Sapphire. If the 280 is no longer available by the time you read this, well, there really isn't a comparable alternative in this price range. But we've seen the GeForce GTX 760 get down to $180 after rebates, so it's your next best option. Other than that, this system remains the same; the Intel Core i3 is a great performer for the money, and the mobo's H97 chipset will support the Broadwell generation of CPUs coming later this year.

MIDRANGE

INGREDIENTS

PART			PRICE
Case	Corsair Vengeance C70		$108
PSU	Corsair CS650M 650W	**NEW**	$75
Mobo	Gigabyte GA-G1.SNIPER Z97		$161
CPU	Intel Core i5-4690K		$240
Cooler	Cooler Master Nepton 280L		$100
GPU	MSI Radeon R9 290 Gaming 4G	**NEW**	$314
RAM	2x 4GB G.Skill Sniper Series 8GB (2x4GB) DDR3/1866		$74
Optical Drive	Samsung SH-224DB/BEBE		$20
SSD	Crucial MX100 256GB		$116
HDD	Seagate Barracuda 3TB ST3000DM001		$103
OS	Windows 8.1 64-bit OEM		$100

Approximate Price: $1,411

WE HAD A GEFORCE GTX 970 in here last month, but then AMD slashed the price on its Radeon R9 290 down to $250 after rebates. However, the listings have started to dry up, indicating a new generation is imminent. So the field has narrowed to MSI's "Gaming 4G" version, at over $300. The EVGA power supply we had is no longer on sale, so we've switched to a Corsair CS650M. This is a "gold" rated unit, so it's very power-efficient. This mobo doesn't have M.2 or SATA Express, but we're trading those for relatively high-quality integrated audio. The Core i5 remains a great workhorse, and a Cooler Master Nepton 280L liquid cooler should give some nice overclocking headroom.

TURBO

INTEL'S X99 PLATFORM continues to be a good buy for what you're getting—a hexa-core workstation CPU for less than $400 is nothing to sneeze at. Add 28 PCI Express lanes on the Intel Core i7-5820K and DDR4 RAM for the X99 chipset and you've got a certifiable powerhouse. In recognition of that, we're bumping the power supply up from 750W to 1,000W, even though the GeForce GTX 980 is a power-efficient card. This Thermaltake PSU is very similar to the one we use in our video card testing system. With a kilowatt of headroom, we could add a third video card if we wanted to. You could argue that the GTX 970 or Radeon R9 290 is better value, but we like putting the top-end SKUs in our top-end system. We heard reports the Gigabyte GA-X99-UD4 motherboard had some stability issues early on, but it appears to have addressed that after delivering a series of BIOS updates. We tested this issue ourselves and were able to confirm that version F9C behaves well.

For more of our component recommendations, visit www.maximumpc.com/best-of-the-best.

INGREDIENTS

PART		PRICE
Case	NZXT Phantom 530	$130
PSU	Thermaltake Toughpower PS-TPD-1000MPCGUS-1 1,000W **NEW**	$80
Mobo	Gigabyte GA-X99-UD4	$224
CPU	Intel Core i7-5820K	$385
Cooler	Cooler Master Nepton 280L	$100
GPU	2x MSI GeForce GTX 980 Gaming 4G	$1,200
RAM	4x 4GB Crucial Ballistix Sport DDR4/2400 4x4GB	$234
Optical Drive	LG Blu-ray Burner WH16NS40	$70
SSD	Samsung 840 EVO 500GB MZ-7TE500BW	$235
HDD	Seagate Barracuda 3TB ST3000DM001	$103
OS	Windows 8.1 64-bit OEM	$100

Approximate Price: $2,901

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